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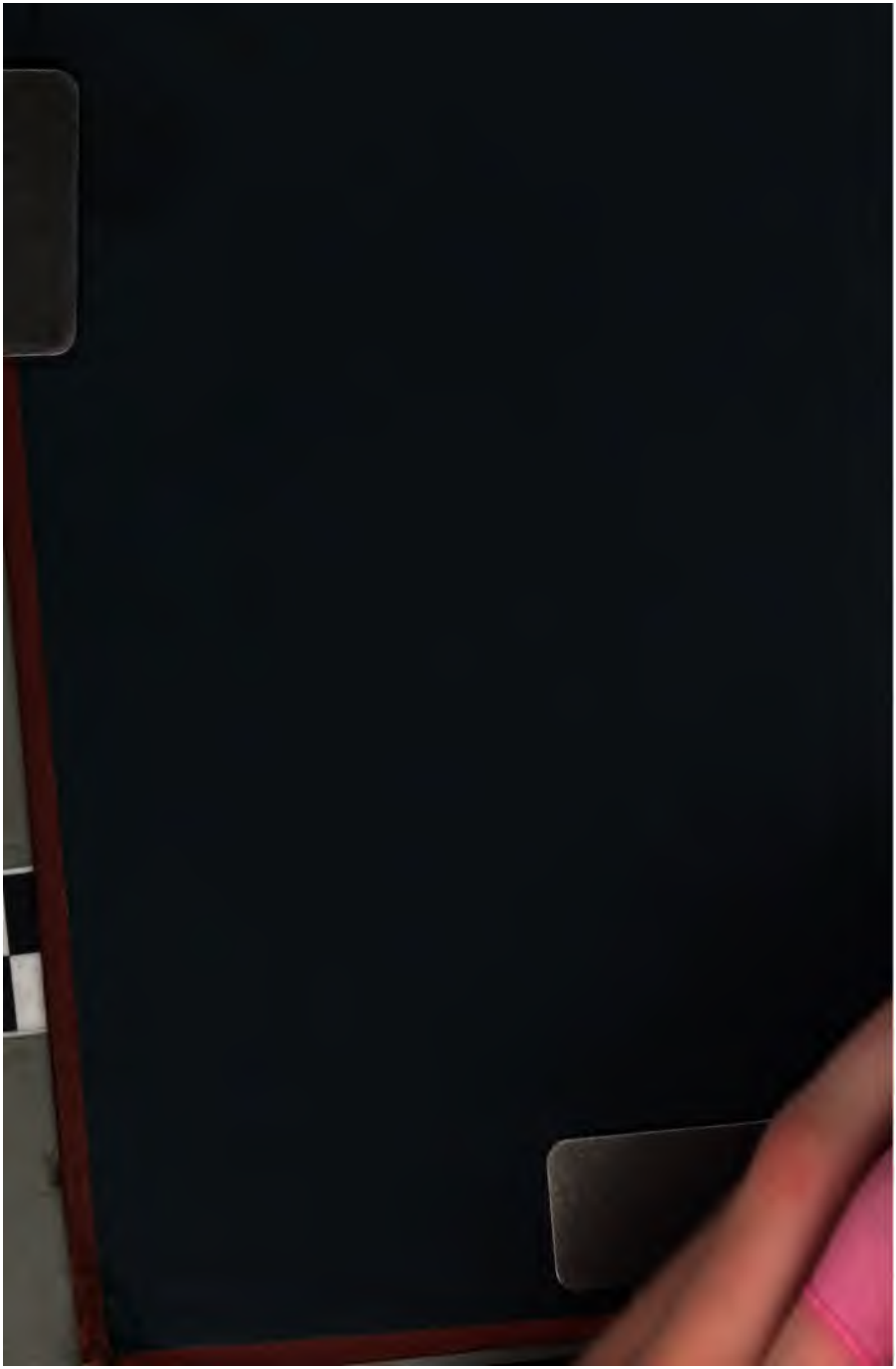

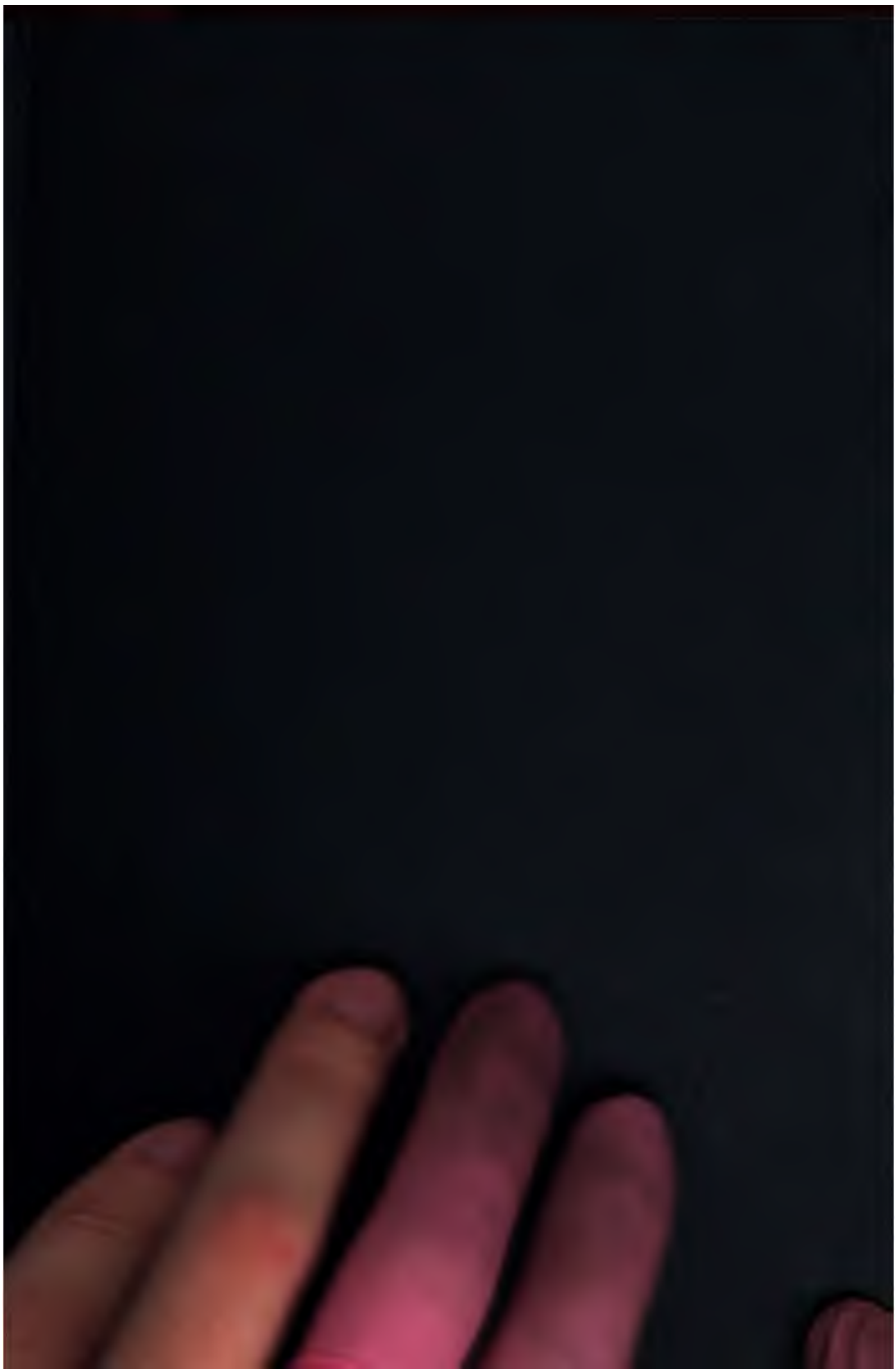

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MANUAL

FOR

MEDICAL OFFICERS OF HEALTH.

BY

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PREFACE.

THE performance of the duties of Medical Officer of Health will be onerous, by reason of the newness of the work to both the sanitary authority and the officer, and the absence of any well established scheme of action on the part of either.

Hence opinions will at first take the place of defined regulations, and differences may occur both between different individuals and in the views of the same person as his experience and knowledge increase.

Moreover the science in some of its aspects will be comparatively new to the medical officer, and newer still to the sanitary authority, for it embraces much that is not included in medical education, and must be acquired by special study. Of these the legal will probably be less easy of acquisition than the sanitary, both because it is less closely associated with medical teaching and is at present spread over many Acts of Parliament, and not always clear even to legal minds.

It follows, therefore, both that much prudence should be exercised by the medical officer in expression and action, and that a Manual which shall prominently bring forward the legal enactments on the subject and advise as to the mode of carrying out the Order of the Local Government Board on this subject may be found useful.

The aim of the author has been to take a somewhat wide range, and to offer a variety of information on the most important parts of the subject.

No inconsiderable proportion of the medical officers of health, of local boards of health, and some of the sanitary authorities composed of guardians of the poor, will not at present be subject to the supervision of the Local Government Board, and will therefore not have the advantage of the information and support which the central authority could confer.

The diversity of view which has been taken as to the area to be allotted to an officer, the salary to be attached to the office, and the duration of the first appointment will not lessen the initial difficulties of his position; neither do they render it an easy task to provide a Manual for officers so differently employed as the district medical officer and the medical officer of health for a whole county. The former in his daily visits not only knows the whole district, but every unhealthy place in it, and becomes acquainted with the existence of causes of disease and of diseases with promptitude and certainty, whilst the latter, knowing little by his own observation, must for the most part act on the information sent to him by subordinate officers. It seems very probable that ere long the former must be the acting officer of health by whatever designation known, whilst the latter will be rather an inspector with certain executive duties.

Whilst there are special powers conferred on medical officers of health by various enactments, the subject almost equally applies to all sanitary authorities, and to those who wish to obtain information on the subject; and hence it is hoped that the present work may be useful to many.

March 1873.

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MANUAL

FOR

MEDICAL OFFICERS OF HEALTH.

INTRODUCTORY.

THE Public Health Act, 1872, made a marked advance on previous sanitary legislation, by providing for the appointment of one sanitary authority in each part of England and Wales, whether urban or rural, and requiring such authority to elect a Medical Officer of Health.

The officers will be appointed subject to the regulations of the Local Government Board, in case any part of their salaries should be paid out of moneys voted by Parliament, but not otherwise. Hence a certain, but probably small, proportion will be exempted from this control and protection, whilst in reference to all others the Local Government Board have issued an order, dated November 11, 1872, defining their qualification, appointment, tenure of office, and duties, which it is the purpose of this work to elucidate.

But before proceeding further, it may be desirable to

point out that a similar office has already existed for some years under the authority of various Acts of Parliament, and notably of the Towns' Improvement Clauses Act, 1847; the Public Health Act, 1848; the Metropolis' Local Management Act, 1855; and the Artisans' and Labourers' Dwellings Act, 1868.

Section 12 of the Towns' Improvement Clauses Act, 1847, enacts as follows:—

TOWNS' IMPROVEMENT CLAUSES ACT, 1847.

(10 & 11 Vict. c. 34.)

The Commissioners may, if they think fit, appoint, subject to the prescribed approval, or, where no approval is prescribed, subject to the approval of one of Her Majesty's Principal Secretaries of State, a person of competent skill and experience, who shall be styled "The Officer of Health," whose duty it shall be to ascertain the existence of diseases within the limits of the special Act, especially epidemics and contagious diseases, and to prevent any nuisance or other local causes likely to cause and continue such diseases, or otherwise injure the health of the inhabitants, and to point out the best means for checking or preventing the spread of such diseases within the limits aforesaid; and also the best means for the ventilation of churches, chapels, schools, registered lodging-houses, and other public buildings, within the limits aforesaid; and from time to time, as required by the Commissioners, to report to them on the matters aforesaid, and to perform any other duties of a like nature which may be required of him. And the Commissioners, with the same approval, which is necessary for the appointment of the officer of health, shall fix the salary to be paid to such officer, and shall pay such salary out of the rates to be levied under this or the special Act; and the Commissioners, with the like approval, may discontinue such officer, or remove any such officer of health.

MINUTE OF GENERAL BOARD OF HEALTH.

The provisions of the Public Health Act, 1848, gave rise to the following valuable Minute of the General Board of Health, which was adopted by the Vestry of Marylebone, in the following words, "With reference to the second part (the duties to be performed), the Committee feel that they cannot improve upon or add to the following summary of the duties of the medical officer of health contained in the Board of Health Minutes of the 20th December, 1855."

It should be read attentively, as a valuable compendium of the mode of performing the duties of this office.

Instructional Minute relative to the Duties and Qualifications of Officers of Health, in Districts under the Public Health Act, 1848.

I. The officer of health is appointed—first, in order that through him the local sanitary authority may be duly informed of such influences as are acting against the healthiness of the population of his district, and of such steps as medical science can advise for their removal; secondly, to execute such special functions as may devolve upon him by the statute under which he is appointed; and, thirdly, to contribute to that general stock of knowledge with regard to the sanitary condition of the people and to the preventible causes of sickness and mortality which, when collected, methodised, and reported to Parliament by the General Board of Health, may guide the Legislature in the extension and amendment of sanitary law.

II. The duties of the officer of health will be to the following effect:—

1. He will make himself familiar with the natural and acquired features of the place, with the social and previous sanitary state of its population, and with all its existing

provisions for health—viz. with the levels, inclinations, soil, wells, and water-springs of the district; with its meteorological peculiarities; with the distribution of its buildings and open spaces, paved or unpaved, of its burial-grounds and lay-stalls; with the plan of its drains, sewers, and water-supply; with the nature of its manufacturing and other industrial establishments; with the house-accommodation of the poorer classes, and the facilities afforded them for bathing and washing; with the arrangements for burial of the dead; and with the regulations in force for lodging-houses and slaughtering-places, for the cleansing of public ways and markets, and for the removal of domestic refuse. And, if he be the first officer of health appointed in his district, he will, without unnecessary delay, furnish to the local board a connected account of these matters, so far as they relate to the public health; making thereon such practical suggestions as he may think applicable.

2. He will invite communications relating to the sanitary wants of the district from the resident clergy, medical practitioners, registrars, relieving-officers, and other persons or societies engaged in the visitation of the poor.

3. He will take the best means in his power to become acquainted from week to week, and, in times of severe disease, from day to day, with the deaths and sicknesses in his district; and he will enquire to what extent they have depended on removable causes.

4. With the assistance of such subordinate officers as the local board may empower him to direct and superintend, he will without intermission see to the wholesomeness of his district; taking care to bring its several parts under examination as often as their sanitary circumstances shall require; and especially observing those places which have previously given occasion of complaint, or been subject to sickness. He will enquire as to the cleanly, wholesome, and weather-proof condition of houses; as to their due ventilation and not overcrowded condition; as to the efficiency of their drainage and water-supply; and as to the absence of dampness and offensive effluvia in and about them. He will examine from time to time the drinking-waters of the place, and will observe whether provisions are offered for sale in any damaged or adulterated state that is hurtful or illegal.

He will occasionally visit all burial-places, and see whether they give any ground for complaint; and he will habitually observe the slaughtering-houses of the district, and other industrial establishments which are liable to emit offensive (especially animal) effluvia.

5. He will report to the local board weekly, annually, and at such intervening times as may require it:—

Weekly, on all deaths (classified according to age, cause, and locality) and, so far as may be practicable, on all important sickness of the district; on such newly observed unwholesome conditions as the local board can abate; and on the completion, progress, or neglect of improvement in matters previously reported on:

Annually, on the sanitary transactions of the year (especially as to the removal of former evils, or the creation of new establishments for sanitary purposes), on whatever incidental changes have been wrought in the physical state of the district, and on the sickness, mortality, and atmospheric conditions of the period:

Using for these reports, as far as convenient, tabular forms and other compendious arrangements; and, in every case where he refers to an existing evil, stating what sanitary rule, measure, or appliance, he deems best for its mitigation.

6. He will attend the local board according to its requirements, will be present at some convenient appointed place as often as may be needful for the receiving of complaints, and in whatever is to be done for the abatement of unwholesome conditions will give all fitting instructions, superintendence, and aid.

III. For the proper performance of these duties, special qualifications in science are required. These lie in pathology, including vital statistics, and in chemistry, with natural philosophy:—

In *pathology*, because this science implies an exact study of the causes of disease in their relation to the living body—a study of what they are, and how they act, and why they seem to vary in operation:

In *vital statistics* (properly a section of pathology), because, by analysing the composition of various death rates, and by learning how the pressure of particular diseases differs under

different circumstances of climate, season, dwelling, age, sex, and occupation, definite standards of comparison are gained, without which the officer of health could not estimate the healthiness or unhealthiness of the population under his charge:

In *chemistry* (including the power of microscopical observation), because without such aid there can be no accurate judgment as to impurities of air and water, dangerous impregnations of soil, or poisonous admixtures in food; and because the same science also guides the application of deodorising and disinfectant agents:

In *natural philosophy*, because many nuisances are traced, and many questions as to ventilation and overcrowding are answered, by its laws; further, because by its aid the officer of health studies the atmospheric changes, and learns the climate of his district—important steps in proceeding to speak of its diseases; and, finally, because natural philosophy, in conjunction with chemistry, renders him competent to report on many manufacturing processes alleged to be hurtful to health, and on the sufficiency of such means as are employed to reduce the evils ascribed to them.

The branches of knowledge here spoken of are parts of every extended medical education—for curative and preventive medicine are founded on a common basis; but they are not the parts which have most direct relation to the treatment of disease. The most distinguished practitioner of a neighbourhood may, indeed, happen to be also the person best qualified for a sanitary appointment: but the reverse must often be the case—for not all members of the medical profession can afford equal leisure to cultivate those distinctive studies; and it will imply no disparagement of men, actively and skilfully engaged in the treatment of disease, if the special qualifications in question should sometimes be found in other members of their profession rather than in them.

On the other hand, it is important for local boards to know that the best training for the general duties of the medical profession is also the best training for the duties of an officer of health; and in choosing among candidates who have not previously held sanitary appointments, electors may properly rest on the evidences of general aptitude for a

medical career, especially where testifying to methodical and industrious habits, to competent powers with some previous discipline in scientific observations, to sober judgment, and to thorough conscientiousness in the investigation and statement of facts.

IV. The occupation of an officer of health will not usually be inconsistent with his devoting a portion of his time to certain other professional engagements; but, where possible, it will be well to debar him from the private practice of his profession:—First, because the claims of such practice would be constantly adverse to those of his public appointment, the duties of which (especially at times of epidemic disease, when his official activity would be most needed) private practice could scarcely fail to interrupt and embarrass; secondly, because the personal relations of private practice might render it difficult for him to fulfil with impartiality his frequent functions of complainant; and, thirdly, because, with a view to the cordial goodwill and co-operation of his medical brethren, it is of paramount importance that the officer of health should not be their rival in practice, and that his opportunities of admonitory intercourse with sick families should not even be liable to abuse for the purposes of professional competition.

Objections of this nature will not generally hold against the officer of health being professionally connected with the medical school or hospital of his town. Provided such engagements are not of too engrossing an amount, it will conduce to the efficiency and public estimation of an officer of health that he be thus kept conversant with the practical aspects of his profession, and have given some security for keeping pace with its scientific progress.

It may happen that the extent of duty to be required from the officer of health in a particular district would not justify the local board in allotting such a salary to the office as might enable its holder to dispense with the income derivable from private practice. But in cases of this description the object would be equally fulfilled if the local boards of neighbouring towns or districts would combine in engaging and remunerating a properly qualified person, on the principle that he should be precluded from private practice,

and should act as officer of health for the two or more boards concurring in his appointment.

W. COWPER,
President.

WHITEHALL,
December 20, 1853.

Section 132 of the Metropolis' Local Management Act, 1855, is founded upon that of the Towns' Improvement Clauses Act, 1847, and is as follows :—

METROPOLIS' LOCAL MANAGEMENT ACT, 1855.

(18 & 19 Vict. c. 120.)

Section 132.—Every vestry and district board shall from time to time appoint one or more legally qualified medical practitioner or practitioners of skill and experience to inspect and report periodically upon the sanitary condition of their parish or district to ascertain the existence of diseases, more especially epidemics, increasing the rate of mortality, and to point out the existence of any nuisance, or other local causes which are likely to originate and maintain such diseases, and injuriously affect the health of the inhabitants, and to take cognisance of the fact of the existence of any contagious or epidemic diseases, and to point out the most efficacious mode of checking or preventing the spread of such diseases, and also to point out the most efficient modes for the ventilation of churches, chapels, schools, lodging-houses, and other public edifices within the parish or district, and to perform any other duties of a like nature which may be required of him or them, and such persons shall be called "Medical Officers of Health," and it shall be lawful for the vestry or board to pay every such officer such salary as they may think fit, and also to remove any such officer at the pleasure of such vestry or board.

ORDER OF THE LOCAL GOVERNMENT BOARD.

The Regulations issued by the Local Government Board, dated November 11, 1872, define the duties of the medical officer of health with more precision than had been theretofore prescribed, and have incorporated many of the previous provisions with some of the suggestions contained in the Minute of the General Board of Health already referred to.

The Order is as follows:—

To the Guardians of the Poor of the Several Unions, Parishes, and Places in England and Wales in which such Guardians act as a Rural [Urban] Sanitary Authority, under the Public Health Act, 1872:

And to all others whom it may concern:

Whereas by Section 10 of the Public Health Act, 1872, it is enacted that it shall be the duty of every rural [urban] sanitary authority to appoint from time to time a medical officer or officers of health, being legally qualified practitioners; and that the Local Government Board shall have the same powers as they have in the case of a district medical officer of a union, with regard to the qualification, appointment, duties, salary, and tenure of office of a medical officer of health, any portion of whose salary is paid out of moneys voted by Parliament:

And whereas it is thereby further enacted, that the same person may, with the sanction of the Local Government Board, be appointed the medical officer of health for two or more sanitary districts, by the joint or several appointment of the sanitary authorities of such districts:

Now we, the Local Government Board, deeming it expedient that regulations should be made with respect to the qualification, appointment, duties, salary, and tenure of office of medical officers of health, to be appointed by rural [urban] sanitary authorities, in all those cases where any

portion of the salary of any such officer is paid out of moneys voted by Parliament, do hereby order and direct as follows :—

Section I.—Qualification.

Article 1.—No person shall be qualified to be appointed to the office of medical officer of health under this order unless he shall be registered under the Medical Act of 1858, and shall be qualified by law to practise both medicine and surgery in England and Wales, such qualification being established by the production to the sanitary authority of a diploma, certificate of a degree, licence, or other instrument granted or issued by competent legal authority in Great Britain or Ireland, testifying to the medical or surgical, or medical and surgical, qualification or qualifications of the candidate for such office.

Provided that the Local Government Board may, upon the application of the sanitary authority, dispense with so much of this regulation as requires that the medical officer of health shall be qualified to practise both medicine and surgery, if he is duly registered under the said Act to practise either medicine or surgery.

Section II.—Appointment.

Article 1.—A statement shall be submitted to the Local Government Board, showing the population and the extent of the district for which the sanitary authority propose to appoint a medical officer or medical officers of health, and the salary or remuneration intended to be assigned; and where the circumstances render desirable the appointment of one medical officer of health for two or more sanitary districts, statements shall, in like manner, be submitted to the Local Government Board, showing the names of the districts to be combined for that purpose, the population and extent of each district, the mode in which it is intended that the appointment shall be made, whether jointly or severally, by the sanitary authorities of those districts, and the amount of salary or remuneration proposed to be assigned to the officer appointed.

Article 2.—When the approval of the Local Government Board has been given to the proposals submitted to them, the sanitary authority or authorities shall proceed to the appointment of a medical officer or medical officers of health accordingly.

Article 3.—No appointment of a medical officer of health shall be made, unless notice has been given at one of the two ordinary meetings next preceding the meeting or meetings at which the appointment is to be made by the sanitary authority or authorities, as the case may be, such notice being duly entered on the minutes, or unless an advertisement giving notice of the day when such appointment will be made shall have appeared in some public newspaper circulating in the district or districts, at least seven days before the day on which such appointment is made: provided that no such notice or advertisement shall be necessary for the appointment of a temporary substitute.

Article 4.—Every such appointment shall, within seven days after it is made, be reported to the Local Government Board by the clerk to the sanitary authority, or, in the case of a joint appointment, by the clerk to one of the sanitary authorities by whom the appointment is made.

Article 5.—Upon the occurrence of a vacancy in such office, the sanitary authority or authorities shall proceed to make a fresh appointment, which shall be reported to the Local Government Board as required by Sect. II. Art. 4, of this order; but if the sanitary authority or authorities desire to make any fresh arrangement with respect to the district or the terms of the appointment, they shall, before filling up the vacancy, supply the particulars of the arrangement to the Local Government Board in the manner prescribed by Sect. II. Art. 1, in regard to the first appointment, and if the approval of the Local Government Board be given, absolutely or with modifications, the sanitary authority or authorities shall then proceed to fill up the vacancy according to the terms of the approval so given.

Article 6.—If any officer appointed under this order be at any time prevented by sickness or accident, or other sufficient reason, from performing his duties, the sanitary authority or authorities, as the case may be, may appoint a person, qualified as aforesaid, to act as his temporary substitute,

and may pay him a reasonable compensation for his services; and every such appointment shall be reported to the Local Government Board as soon as the same shall have been made.

Section III.—Tenure of Office.

Article 1.—Every officer appointed under this order shall continue to hold office for such period as the sanitary authority or authorities appointing him may, with the approval of the Local Government Board, determine, or until he die, or resign, or be removed, by such authority or authorities with the assent of the Local Government Board, or by the Local Government Board.

Provided that the appointments first made under this order shall not be for a period exceeding five years.

Article 2.—Where any such officer shall be appointed for one or more sanitary districts, and any change in the extent of the district or districts, or in the duties, salary, or remuneration, shall be deemed necessary, and he shall decline to acquiesce therein, the sanitary authority or authorities by whom he was so appointed may, with the consent of the Local Government Board, but not otherwise, and after six months' notice in writing, signed by their clerk or clerks, given to such officer, determine his office.

Article 3.—No person shall be appointed who does not agree to give one month's notice previous to resigning the office, or to forfeit such sum as may be agreed upon as liquidated damages.

Section IV.—Duties.

The following shall be the duties of a medical officer of health in respect of the sanitary district for which he is appointed; or if he shall be appointed for more than one district, or for a part of a district, then in respect of each of such districts, or of such part:—

(1) He shall inform himself as far as practicable respecting all influences affecting or threatening to affect injuriously the public health within the district.

(2) He shall enquire into and ascertain by such means as

are at his disposal the causes, origin, and distribution of diseases within the district, and ascertain to what extent the same have depended on conditions capable of removal or mitigation.

(3) He shall by inspection of the district, both systematically at certain periods and at intervals as occasion may require, keep himself informed of the conditions injurious to health existing therein.

(4) He shall be prepared to advise the sanitary authority on all matters affecting the health of the district, and on all sanitary points involved in the action of the sanitary authority; and in cases requiring it, he shall certify, for the guidance of the sanitary authority, or of the justices, as to any matter in respect of which the certificate of a medical officer of health or a medical practitioner is required as the basis or in aid of sanitary action.

(5) He shall advise the sanitary authority on any question relating to health involved in the framing and subsequent working of such by-laws and regulations as they may have power to make.

(6) On receiving information of the outbreak of any contagious, infectious, or epidemic disease of a dangerous character within the district, he shall visit the spot without delay and enquire into the causes and circumstances of such outbreak, and advise the persons competent to act as to the measures which may appear to him to be required to prevent the extension of the disease, and, so far as he may be lawfully authorised, assist in the execution of the same.

(7) On receiving information from the inspector of nuisances that his intervention is required in consequence of the existence of any nuisance injurious to health, or of any overcrowding in a house, he shall, as early as practicable, take such steps authorised by the statutes in that behalf as the circumstances of the case may justify and require.

(8) In any case in which it may appear to him to be necessary or advisable, or in which he shall be so directed by the sanitary authority, he shall himself inspect and examine any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour, exposed for sale, or deposited for the purpose of sale or of preparation for sale, and intended for the food of man, which is deemed to

be diseased, or unsound, or unwholesome, or unfit for the food of man; and if he finds that such animal or article is diseased, or unsound, or unwholesome, or unfit for the food of man, he shall give such directions as may be necessary for causing the same to be seized, taken, and carried away, in order to be dealt with by a justice according to the provisions of the statutes applicable to the case.

(9) He shall perform all the duties imposed upon him by any by-laws and regulations of the sanitary authority, duly confirmed, in respect of any matter affecting the public health, and touching which they are authorised to frame by-laws and regulations.

(10) He shall enquire into any offensive process of trade carried on within the district, and report on the appropriate means for the prevention of any nuisance or injury to health therefrom.

(11) He shall attend at the office of the sanitary authority, or at some other appointed place, at such stated times as they may direct.

(12) He shall from time to time report, in writing, to the sanitary authority his proceedings, and the measures which may require to be adopted for the improvement or protection of the public health in the district. He shall in like manner report with respect to the sickness and mortality within the district, so far as he has been enabled to ascertain the same.

(13) He shall keep a book or books, to be provided by the sanitary authority, in which he shall make an entry of his visits, and notes of his observations and instructions thereon, and also the date and nature of applications made to him, the date and result of the action taken thereon, and of any action taken on previous reports, and shall produce such book or books, whenever required, to the sanitary authority.

(14) He shall also prepare an annual report, to be made to the end of December in each year, comprising tabular statements of the sickness and mortality within the district, classified according to diseases, ages, and localities, and a summary of the action taken during the year for preventing the spread of disease. The report shall also contain an account of the proceedings in which he has taken part or

advised under the sanitary Acts, so far as such proceedings relate to conditions dangerous or injurious to health, and also an account of the supervision exercised by him, or on his advice, for sanitary purposes over places and houses that the sanitary authority has power to regulate, with the nature and results of any proceedings which may have been so required and taken in respect of the same during the year. It shall also record the action taken by him, or on his advice, during the year, in regard to offensive trades, bakehouses, and workshops.

(15) He shall give immediate information to the Local Government Board of any outbreak of dangerous epidemic disease within the district, and shall transmit to the Board, on forms to be provided by them, a quarterly return of the sickness and deaths within the district, and also a copy of each annual and of any special report.

(16) In matters not specifically provided for in this order, he shall observe and execute, so far as the circumstances of the district may require, the instructions of the Local Government Board on the duties of medical officers of health, and all the lawful orders and directions of the sanitary authority applicable to his office.

(17) Whenever the Diseases' Prevention Act of 1855 is in force within the district, he shall observe the directions and regulations issued under that Act by the Local Government Board, so far as the same relate to or concern his office.

(18) [*Omitted in Urban.*] Where more than one medical officer of health shall be appointed by a sanitary authority, such authority, with the approval of the Local Government Board, may either assign to each of the officers a portion of the district, or may distribute the duties of medical officer of health amongst such officers.

Section V.—Remuneration.

Article 1.—The sanitary authority or authorities, as the case may be, shall pay to any officer appointed under this order such salary or remuneration as may be approved by the Local Government Board; and where such officer is appointed for two or more districts, the salary shall be

apportioned amongst the districts in such manner as the said Board shall approve.

Provided that the sanitary authority or authorities, with the approval of the Local Government Board, may pay to any such officer a reasonable compensation on account of extraordinary services, or other unforeseen circumstances connected with his duties or the necessities of the district or districts for which he is appointed.

Article 2.—The salary or remuneration of every such officer shall be payable up to the day on which he ceases to hold the office, and no longer, subject to any deduction which the sanitary authority or authorities may be entitled to make in respect of Sect. III. Art. 3; and in case he shall die whilst holding such office, the proportion of salary (if any) remaining unpaid at his death shall be paid to his personal representatives.

Article 3.—The salary or remuneration assigned to such officer shall be payable quarterly, according to the usual feast days in the year—namely, Lady Day, Midsummer Day, Michaelmas Day, and Christmas Day; but the sanitary authority or authorities may pay to him at the expiration of every calendar month such proportion as they may think fit on account of the salary or remuneration to which he may become entitled at the termination of the quarter.

Given under our seal of office this 11th day of November, in the year 1872.

JAMES STANSFELD,
President.

JOHN LAMBERT, *Secretary.*

Such are the terms of this important document; and on proceeding to consider them *seriatim*, it will be convenient to point out that the duties of the medical officer of health, as thus prescribed, may be classified as follows:—

I. As to the Causes and Distribution of Disease (Nos. 1, 2, and 3).

II. As to Personal Action under the Diseases' Prevention Act, 1855, and during an Attack of Epidemic Disease (Nos. 6 and 17).

III. As to the Reports of the Inspector of Nuisances in reference to Overcrowding, etc. (No. 7).

IV. As to Food unfit for the Use of Man (No. 8).

V. As to Offensive Processes of Trade (No. 10).

VI. As to Advising the Sanitary Authority (Nos. 4 and 5).

VII. As to Routine, Attendance, and Reports (Nos. 11, 12, 13, and 15).

VIII. As to Duties not Defined (Nos. 9 and 16).

We shall now proceed to consider these subjects in the order thus indicated; but as some are referred to under more than one head, we shall treat such cursorily in one and more at length in another part of this work.

CHAPTER I.

CAUSES AND DISTRIBUTION OF DISEASE.

I. HE SHALL INFORM HIMSELF AS FAR AS PRACTICABLE RESPECTING ALL INFLUENCES AFFECTING OR THREATENING TO AFFECT INJURIOUSLY THE PUBLIC HEALTH WITHIN THE DISTRICT.

It is clear from the terms of this clause that the influences with which the medical officer of health must acquaint himself have an intimate relation to the office which he holds, for they are only such as affect, or at least threaten to affect, injuriously the public health. He is not called upon to interfere in matters of less importance, as, for example, in those which may influence the appearance of a locality, and not necessarily even in such as may offend the senses of sight and smell; and although it will be his duty to estimate the true influence of offensive conditions, he is not required to take action thereon unless in his opinion they are influences affecting or threatening to affect injuriously the public health. It may not be an easy task to arrive at a just conclusion on the latter head, but the limitation will relieve him of duties which would be more onerous than useful, and allow him to devote his attention to the higher duties connected with the public health.

The influences referred to will no doubt be numerous in

the aggregate, but they will not be the same, either in nature or number, in every locality, and for the most part will be patent to even non-professional persons.

Among them may be included the following, viz. :—

1. Construction of Houses ;
2. Ventilation ;
3. Drains and Drainage ; Petties, and other Accumulations of Filth ;
4. Personal Habits ;
5. Poverty ;
6. Climate and Topographical Influences ;

to each of which we shall now briefly refer ; besides—

7. Water Supply ;
8. Food ;
9. Air ;
10. Trades ;

which will be treated at length under the subsequent clauses of this Order.

Section I.

AS TO THE CONSTRUCTION OF HOUSES IN REFERENCE TO THE PRODUCTION OF DISEASE.

UNWHOLESOME HOUSES.

The influences connected with this cause will include cold, damp, imperfect ventilation, and imperfect drainage.

Cold.

The coldness of a house, apart from that of the general state of the atmosphere, is sometimes due to the materials

of which it is composed. In certain parts of England, and particularly in the south and west, houses built entirely of wood may still be found, and they are not always lined with wood or covered on the inside with lath and plaster. Hence the wind penetrates the interstices between the boards, and the walls are insufficient to maintain an equable degree of temperature within the house in hot and cold weather. In other parts of the country, and particularly in South Wales, the houses are built entirely of clay, and the walls are very apt to crumble, and to lose their power to exclude the winds. A third kind is a mixture of the two, with a framework of solid timber, and the intervals filled up with clay, or partly with clay and partly with bricks. Such are found in Hampshire and other agricultural counties in England. A more universal cause is the imperfect closing of the doors and windows, deficiency of glass in the windows, and, in general, defects in both walls and roof. Such is still very common in the old houses occupied by labourers in purely agricultural counties, but happily the proportion is diminishing.

Damp.

Dampness of the house arises from several causes, as, for example, the state of the floor, roof, and walls.

But few cottages have as yet been erected with an impervious covering to the ground, or have drains so placed as to carry off all moisture, whilst many are situate below the level of the contiguous land, and are liable to be inundated during rains, and to be kept damp at all times by the water percolating through the soil. This effect is shown by the colour of the floor bricks or tiles, or by the decay of the wood

forming the floor. To this may be added the improper mode of washing such floors, by which a large quantity of moisture is left upon them, to the culinary operations of the household, to the wetness of clothes and boots in winter, and to deficiency of firing. Such is probably the most fruitful source of ill-health and disease among the women and children of the poor, by keeping the feet cold, and saturating the air of the house with moisture.

When the roof is defective, wet or moisture will be admitted in rainy weather, and cause either a smell of dampness with saturation of the air, as in many old thatched-roofed houses, or admit the rain in drops or streams, and cause the ceiling, walls, and floor to be wet or damp. In the latter state the house becomes untenantable, and, except where the number of houses is inadequate to the wants of the neighbourhood, becomes untenanted, unless the landlord, in his own interest, repairs it.

Walls are very generally damp by reason of the porous nature of the materials used in their construction and the absence of a proper damp course. Wooden and clay walls are more liable to this result than brick walls, but the latter, even when built nine inches thick, are by no means impervious to beating rains. It is true that in some instances the walls of small houses are of greater thickness, but, on the other hand, there are not a few where the end wall, or other wall, is only four inches and a half thick, and neither prevents cold nor damp. Stone walls are commonly of greater thickness than nine inches, and are drier than brick walls, but a porous sandstone will allow the moisture to pass through a wall more than a foot in thickness.

Walls built of concrete are now much recommended even

for cottages as a protection against damp, as well as on the plea of economy, but further experience is required as to their power to prevent damp and resist disintegration.

Ventilation.

Defective ventilation is almost universal, and is none the less potent that the inhabitants disregard it. This arises from several defects of construction, and, paradoxical as it may seem, even from excellence of workmanship.

When houses are built back to back, as may be seen in every town in the kingdom, but more commonly in those abounding in poor inhabitants, and have rapidly extended, it is scarcely possible to cleanse the air by a through current, even under the most favourable circumstances of habitation; but, in addition to this necessary evil, there are the impediments of clothes, furniture, enclosures, and piles of rubbish which render it impossible, even with the doors and windows temporarily opened. Hence such houses are really unfit for human habitation, and in localities where proper regulations exist, they are no longer built.

The like state of things occurs even in double houses, where there are rooms which have openings on one side only, but such are rare as compared with those which have a door and window in two contiguous, if not opposite, sides. The latter class of rooms may be ventilated on special occasions when the door and windows are opened, and there is some degree of movement of the atmosphere; but even then the line of cleansing will not necessarily extend far from that of the current, and corners out of the latter range may remain foul.

But the universal defect is the entire absence of any special

means of ventilation apart from the door, windows, and chimney-flue. At night and in wet weather the two former are generally closed, whilst it is very usual to close the latter in the summer, and indeed in any season when a fire is not required, as in bedrooms generally. The evil varies, doubtless, with the locality and mode of construction of the dwelling, so that it is less in the open country with exposure to the winds from all quarters and with ill-fitting doors and window-sashes, whilst it is greater in the close alleys and narrow streets of towns, for there the wind penetrates directly in only two opposed directions, and in a very modified degree, and better workmanship may seal the doors and windows, and convert the bedroom into a closed box. It is difficult to believe that our ancestors could have been free from fever had the workmanship and state of repair of the doors and windows been as good as even that of the town cottage property of our day, and it is clear that we have increased this universal cause of disease.*

Drainage.

House drainage has reference to both the drains within the houses and those in the yard or adjoining ground. We have glanced at the former, but may now add that the defect is often much greater in such houses as have a basement below the level of the ground, from which it is difficult to obtain a fall. This evil is not confined to towns, but in country houses not favourably situate it is no uncommon event to find the cellar drainage imperfect, and an accumulation of stagnant and sometimes offensive water there. Drainage on that level is, however, as necessary as in the

* See also page 40.

living-rooms, and that from the yard is essential for the removal of the rainfall and slops, as well as other fluid decomposing matters from the house.

But the character of the drains and the efficacy of the drainage demand as much attention as the fact of the existence of a drain. The drain will contain offensive solid, liquid, and gaseous matter, and if the two former be not carried away, they must return to the house, whilst the latter, having commonly a less specific gravity than common air, will surely re-enter the house, unless prevented by a proper system of traps. We shall refer to this subject again, but may add here that it is possible that a house with defective drains may be far more unhealthful than one without any drains. Such will frequently be the case in country localities where the drains lead into a closed cesspool, and where the flushing of the pipes is defective, particularly in the droughts of summer.*

WHOLESOME HOUSES.

Such is a very rapid sketch of the evils which are very general—almost universal—in the construction of houses in this country, and the prime causes of disease. By way of contrast we will proceed to describe those conditions which are desirable, and point out the regulations which the law has laid down, and with which it is necessary that the medical officer of health should be acquainted.

The legislation of the country has not entered minutely into the sanitary principles of construction, but has been satisfied with scarcely more than giving the local authorities power

* See also pages 54 and 181.

to make by-laws to be approved by the Secretary of State, and not inconsistent with any provisions of the general laws. One general law of great utility was passed in 1847, and known as the Towns' Improvement Act, which contains many valuable clauses intended for adoption by the local authorities, but not made compulsory on any. They are limited in their scope, and of a general nature; whilst the by-laws of the local authority are more minute, and more carefully adapted to the conditions existing in each locality.

These provisions have notably been embodied in the Metropolitan Buildings Act, and many others of the highest importance have been added, which are specially fitted for the metropolis and other towns where large buildings are erected, and where there is a dense population.

The general provisions have reference chiefly to:—

The Material and the Thickness of the Walls;
The Construction of Cellar Dwellings;
The Materials to be used in the Roofs;
The Ventilation of Public Buildings; and
The System of Water-closets and Drainage.

In the remarks which we shall have to make, we cannot profitably enter into very minute particulars, but will endeavour to introduce those which demand attention.

In reference to the foundation and ground-floor, we remark that the ground should be excavated from beneath the line of the proposed floor, and filled in with concrete to the depth of six to twelve inches, so as to prevent the ascent of moisture from the earth to the floor. The cost is rarely considerable, and it should not be omitted in even labourers' cottages, or where there is a cellar in the basement,

so constructed that water from that level may be carried away. It is, however, the most useful where there is no cellar, and where it will constitute the floor of the living-room.

Where tiles, bricks, or stone, are used for flooring, they should be placed upon the concrete, and well fitted with good mortar or cement, and where wood is employed, the joists should be laid upon the same. In the latter case, a further advantage may be gained by the use of gas-tar between the joists, and on the walls to the floor-level. Ventilators are also essential, to prevent damp and rot, by maintaining a current of air under the boards, and care should be taken to so place them on two sides that this result may be effected.

This is the most desirable improvement in the erection of cottages. The use of tiles for the ground-floor is still very general in the country, although it is equally rare in towns, and has the advantage of providing a material which is not readily pervious to moisture, is easily cleansed, and is durable and cheap. The tendency of the day is, however, to substitute wood, inasmuch as a wooden floor is warmer, and looks cleaner, and is less costly than formerly, and having regard to the use of the floor by young children, and the aged, and to a greater degree by women than men, the tendency should be further strengthened and the use of tiles limited to the scullery, cellar, and other rooms temporarily used. With this change, it would be necessary that the wooden floor should be well constructed, and in particular that the boards should be grooved and tongued, so as to prevent drainage between them, and accumulation of foul water underneath.

METROPOLITAN BUILDINGS ACT, 1855.

The following are the regulations with regard to walls, as contained in the First Schedule (Parts I. and II.) of the Metropolitan Buildings Act, 1855, 18 and 19 Vict. c. 122.

FIRST SCHEDULE.

PRELIMINARY.

Structure of Buildings.

1. Every building shall be enclosed with walls constructed of brick, stone, or other hard and incombustible substances, and the foundations shall rest on the solid ground, or upon concrete or upon other solid substructure.

Construction of Walls of Brick, Stone, &c.

2. Every wall constructed of brick, stone, or other similar substances shall be properly bonded and solidly put together with mortar or cement, and no part of such wall shall overhang any part underneath it, and all return walls shall be properly bonded together.

Extra Thickness of certain Stone Walls.

3. The thickness of every stone wall in which the beds of the masonry are not laid horizontally shall be one-third greater than the thickness prescribed for stone walls in the rules hereinafter contained.

Thickness of Walls.

4. The thickness of every wall as hereinafter determined shall be the minimum thickness.

Height of Story.

5. The height of every topmost story shall be measured from the level of its floor up to the under side of the tie of the roof, or up to half the vertical height of the rafters, when

the roof has no tie; and the height of every other story shall be the clear height of such story exclusive of the thickness of the floor.

Height of External and Party Walls.

.6. The height of every external and party wall shall be measured from the base of the wall to the level of the top of the topmost story.

Length of Walls.

7. Walls are deemed to be divided into distinct lengths by return walls, and the length of every wall is measured from the centre of one return wall to the centre of another; provided that such return walls are external, party, or cross walls of the thickness hereinafter required, and bonded into the walls so deemed to be divided.

Footings of Walls.

8. The projection of the bottom of the footing of every wall, on each side of the wall, shall be at least equal to one-half of the thickness of the wall at its base; and the diminution of the footing of every wall shall be formed in regular offsets, and the height from the bottom of such footing to the base of the wall shall be at the least equal to one-half of the thickness of the wall at its base.

PART I.

RULES FOR THE WALLS OF DWELLING-HOUSES.

Thickness of Walls of Dwelling-houses.

1. The external and party walls of dwelling-houses shall be made throughout the different stories of the thickness shown in the following table, arranged according to the heights and lengths of the walls, and calculated for walls up to one hundred feet in height, and supposed to be built of bricks not less than eight and a half inches and not more than nine and a half inches in length, the heights of the stories being subject to the condition hereinafter given.

(No. 1.)

I.	II.	III.	IV.
Height up to 100 feet.	Length up to 45 Feet. Two stories, 21½ inches. Three stories, 17½ inches. Remainder, 13 inches.	Length up to 80 feet. Two stories, 26 inches. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length unlimited. One story, 30 inches. Two stories, 26 inches. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.
Height up to 90 feet.	Length up to 45 feet. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length up to 70 feet. One story, 26 inches. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length unlimited. One story, 30 inches. Two stories, 26 inches. One story, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.
Height up to 80 feet.	Length up to 40 feet. One story, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length up to 60 feet. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length unlimited. One story, 26 inches. Two stories, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.
Height up to 70 feet.	Length up to 40 feet. Two stories, 17½ inches. Remainder, 13 inches.	Length up to 55 feet. One story, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.	Length unlimited. One story, 26 inches. Two stories, 21½ inches. One story, 17½ inches. Remainder, 13 inches.
Height up to 60 feet.	Length up to 30 feet. One story, 17½ inches. Remainder, 13 inches.	Length up to 50 feet. Two stories, 17½ inches. Remainder, 13 inches.	Length unlimited. One story, 21½ inches. Two stories, 17½ inches. Remainder, 13 inches.
Height up to 50 feet.	Length up to 30 feet. Wall below the topmost story, 13 inches. Topmost story, 8½ inches. Remainder, 8½ inches.	Length up to 45 feet. One story, 17½ inches. Rest of wall below topmost story, 13 inches. Topmost story, 8½ inches. Remainder, 8½.	Length unlimited. One story, 21½ inches. One story, 17½ inches. Remainder, 13 inches.
Height up to 40 feet.	Length up to 35 feet. Wall below two topmost stories, 13 inches. Two topmost stories, 8½ inches. Remainder, 8½ inches.	Length unlimited. One story, 17½ inches. Rest of wall below topmost story, 13 inches. Topmost story, 8½ inches. Remainder, 8½ inches.	
Height up to 30 feet.	Length up to 35 feet. Wall below two topmost stories, 13 inches. Two topmost stories, 8½ inches. Remainder, 8½ inches.	Length unlimited. Wall below topmost story, 13 inches. Topmost story, 8½ inches. Remainder, 8½ inches.	
Height up to 25 feet.	Length up to 30 feet. From base to top of wall, 8½ inches.	Length unlimited. Wall below topmost story, 13 inches. Topmost story, 8½ inches. Remainder, 8½ inches.	

Explanation of Tables.

3. In using the above table the height of the wall is to be reckoned on the first vertical column on the left hand of the table, and the length of the wall on the corresponding horizontal column. The thickness of the wall in each story is given in inches, and begins with the wall from the base upwards.

Qualification in case of certain Walls.

4. If any external or party wall, measured from centre to centre, is not more than twenty-five feet distant from any other external or party wall to which it is tied by the beams of any floor or floors, other than the ground floor, or the floor of any story formed in the roof, the length of such wall is not to be taken into consideration, and the thickness of the wall will be found in the second vertical column in the above table.

Condition in respect of Stories exceeding a certain Height.

5. If any story exceeds in height sixteen times the thickness prescribed for the walls of such story in the above table, the thickness of each external and party wall throughout such story shall be increased to one-sixteenth part of the height of the story; but any such additional thickness may be confined to piers properly distributed, of which the collective widths amount to one-fourth part of the length of the wall.

Restriction in case of certain Stories.

6. No story enclosed with walls less than thirteen inches in thickness shall be more than ten feet in height.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

7. The thickness of any wall of a dwelling-house, if built of materials other than such bricks as aforesaid, shall be

deemed to be sufficient if made of the thickness required by the above tables, or of such less thickness as may be approved by the Metropolitan Board, with this exception, that in the case of walls built of stone in which the beds of the masonry are not laid horizontally no diminution shall be allowed in the thickness required by the foregoing rules for such last-mentioned walls.

Rule as to Buildings not being Public Buildings or Buildings of the Warehouse Class.

8. All buildings, excepting public buildings, and such buildings as are hereinafter defined to be buildings of the warehouse class, shall, as respects the thickness of their walls, be subject to the rules given for dwelling-houses.

PART II.

RULES FOR THE WALLS OF BUILDINGS OF THE WAREHOUSE CLASS.

Definition of Warehouse Class.

1. The warehouse class shall comprise all warehouses, manufactories, breweries, and distilleries.

Thickness at Base.

2. The external and party walls of buildings of the warehouse class shall at the base be made of the thickness shown in the following table, calculated for walls up to one hundred feet in height, and supposed to be built of bricks not less than eight and a half inches and not more than nine and a half inches in length.

(No. 2.)

I.	II.	III.	IV.
Height up to 100 feet.	Length up to 55 feet. — Base, 26 inches.	Length up to 70 feet. — Base, 30 inches.	Length unlimited. — Base, 34 inches.
Height up to 90 feet.	Length up to 60 feet. — Base, 26 inches.	Length up to 70 feet. — Base, 30 inches.	Length unlimited. — Base, 34 inches.
Height up to 80 feet.	Length up to 45 feet. — Base, 21½ inches.	Length up to 60 feet. — Base, 26 inches.	Length unlimited. — Base, 30 inches.
Height up to 70 feet.	Length up to 30 feet. — Base, 17½ inches.	Length up to 45 feet. — Base, 21½ inches.	Length unlimited. — Base, 26 inches.
Height up to 60 feet.	Length up to 35 feet. — Base, 17½ inches.	Length up to 50 feet. — Base, 21½ inches.	Length unlimited. — Base, 26 inches.
Height up to 50 feet.	Length up to 40 feet. — Base, 17½ inches.	Length up to 70 feet. — Base, 21½ inches.	Length unlimited. — Base, 26 inches.
Height up to 40 feet.	Length up to 30 feet. — Base, 13 inches.	Length up to 60 feet. — Base, 17½ inches.	Length unlimited. — Base, 21½ inches.
Height up to 30 feet.	Length up to 45 feet. — Base, 13 inches.	Length unlimited. — Base, 17½ inches.	
Height up to 25 feet.	Length unlimited. — Base, 13 inches.		

Explanation of Table.

4. The above table is to be used in the same manner as the table previously given for the walls of dwelling-houses, and is subject to the same qualifications and conditions respecting walls not more than twenty-five feet distant from each other.

Thickness at Top of Walls and through Intermediate Space.

5. The thickness of the walls of buildings of the warehouse class at the top, and for sixteen feet below the top, shall be thirteen inches; and the intermediate parts of the

wall between the base and such sixteen feet below the top shall be built solid throughout the space between straight lines drawn on each side of the wall, and joining the thickness at the base to the thickness at sixteen feet below the top, as above determined; nevertheless in walls not exceeding thirty feet in height the walls of the topmost story may be eight inches and a half thick.

Condition in respect of Stories exceeding a certain Height.

6. If in any story of a building of the warehouse class the thickness of the wall, as determined by the rules hereinbefore given, is less than one-fourteenth part of the height of such story, the thickness of the wall shall be increased to one-fourteenth part of the height of the story; but any such additional thickness may be confined to piers properly distributed, of which the collective widths amount to one-fourth part of the length of the wall.

Thickness of Walls built of Materials other than such Bricks as aforesaid.

7. The thickness of any wall of a building of the warehouse class, if built of materials other than such bricks as aforesaid, shall be deemed to be sufficient if made of the thickness required by the above tables, or of such less thickness as may be approved by the Metropolitan Board, with this exception, that in the case of walls built of stone in which the beds of the masonry are not laid horizontally, no diminution shall be allowed in the thickness required by the foregoing rules for such last-mentioned walls.

MISCELLANEOUS.

Cross Walls.

1. The thickness of a cross wall shall be two-thirds of the thickness hereinbefore required for an external or party wall of the same dimensions, and belonging to the same class of buildings, but never less than eight and a half inches, and no wall subdividing any building shall be deemed to be a cross wall unless it is carried up to two-thirds of the height of the external or party walls, and unless the recesses and openings therein do not exceed one-half of the vertical surface of the wall in each story.

Extra Thickness of certain Stone Walls.

2. The thickness of every stone wall in which the beds of the masonry are not laid horizontally shall be one-third greater than the thickness prescribed in the rules aforesaid.

3. Buildings to which the preceding rules are inapplicable require the special sanction of the Metropolitan Board of Works.

This Act applies to only a limited area, but it might be adopted in every large town, if not in country localities. Walls should be universally of brick, stone, or concrete, and never of wood or clay, and there should be one or more damp courses consisting of slates with gas-tar or other impervious material, so as to prevent the ascent of the damp from the ground. Where the inner walls are built of wood, the piers should rest upon some impervious material. It would be an additional advantage if nine-inch brick walls were cemented on the inside, as a further protection from the damp; but this can scarcely be effected in cottages without unduly increasing the cost, and thereby the rent.

Thatched roofs, when properly renewed and kept in good repair, are warm in winter and cool in summer, and cannot on that ground be objected to; but, as a protection against fire, they are not allowed in towns.

The following is the provision in the Towns' Improvement Clauses Act, 1847:—

TOWNS' IMPROVEMENT CLAUSES ACT, 1847.

(10 & 11 Vict. c. 34.)

As to Combustible Materials.

Section 109.—The party-walls . . . . . and the coverings of the roof shall not, without the previous consent in writing of the commissioners, be constructed of combustible materials; and it shall not be lawful for the

owner of any building within the limits of the special Act, having at the passing of the special Act a roof covered with thatch or other combustible material, and contiguous to or adjoining to any other building, to suffer such covering to such roof to remain for a longer period than seven years after the passing of the special Act, unless with the consent in writing of the commissioners, and every person who shall erect any building, or cover any roof, or suffer the covering of any roof to continue, contrary to the provisions herein contained, and who shall not remove or alter the same within one month after notice given to him for that purpose by the commissioners, shall be liable to a penalty not exceeding one pound for every day that such building or covering to such roof shall so continue.

Having regard to the inflammability of thatch, and, generally speaking, to convenience and, perhaps, economy, it is now better, even in country places, to roof with slates or tiles, and to well point them on the inside. In Yorkshire, a tolerably thin sandstone is substituted for slates, but the roof requires stronger timber, and, unless the pitch be very low, is not so easily kept watertight and in repair as with slates. Damp may be effectually excluded by a good slate roof; but there are great variations of temperature under it, and it is requisite to place a ceiling between the roof and the occupant of the house. Hence bedrooms in the roof without the protection of a ceiling or a sufficient internal lining of the slates should not be allowed.

Ceilings of lath and plaster are almost universal in this country, whilst in countries where wood abounds they are generally made with that material. The ceiling next the roof should be flat, and on the level of the wall-plate if possible; but it is not unusual to place it higher, even to the tie-beam, so as to increase the height of the upper floor. In such a construction, the sides of the roof immediately under

the slates should be protected by lath and plaster, or by wood.

Floors of plaster are still in common use in many parts of the country for bedrooms, and are more economical than wood. They are, however, cold to the feet, liable to get out of repair, and not capable of repair without the line of junction being apparent, and should be universally supplanted by wood.

The height of rooms is fixed at a minimum of seven feet by the Metropolitan Buildings Act, 1855, according to the following regulations in Section 23 :—

METROPOLITAN BUILDINGS ACT, 1855.

(18 & 19 Vict. c. 122.)

As to the Height of Rooms.

Section 23.—The following rules shall be observed with respect to habitable rooms in any building (that is to say) :—

1. Every habitable room hereafter constructed in any building, except rooms in the roof thereof, and cellars, and underground rooms, shall be in every part at the least seven feet in height from the floor to the ceiling :
2. Every habitable room hereafter constructed in the roof of every building shall be at the least seven feet in height, from the floor to the ceiling throughout, not less than one-half the area of such room :
3. Cellars and underground rooms shall be constructed in manner directed by the said Act for the better local government of the metropolis :

And whosoever knowingly suffers any room that is not constructed in conformity with this section to be inhabited shall, in addition to any other liabilities he may be subject to under this Act, incur a penalty not exceeding twenty shillings for every day during which such room is inhabited, and any room in which any person passes the night shall be deemed to be inhabited within the meaning of this Act.

It is, however, clear that the height should be greater than seven feet for the purposes of ventilation, as well as on the score of health and convenience; but to that subject we shall again refer. The usual height varies from eight feet to twelve, the former in cottages, whether in country or town, but chiefly in the country, and the latter in the houses of the middle and wealthy classes, and some intermediate height is almost universal in towns. It is customary to give greater height to the living than the sleeping-rooms, but that is an architectural arrangement for effect, rather than a sanitary necessity, for, having regard to the closure of the bedroom during the night, the height should rather be greater than less.

The Act referred to recognises three classes of rooms, and we may admit that rooms in the roof and in the basement (both of which are somewhat exceptional in their use) may be lower than the ordinary living and sleeping-rooms, and probably might be allowed to be seven to eight feet. The following are the provisions contained in the Towns' Improvement Act, 1847, and the Metropolis' Local Managment Act, 1855, in reference to inhabited rooms in the basement:—

CELLAR DWELLINGS.

Towns' Improvement Clauses Act, 1847.

(10 & 11 Vict. c. 34.)

As to Cellars in Courts.

Section 113.—It shall not be lawful to let separately, except as a warehouse or storehouse, or to suffer to be occupied as a dwelling-place, any cellar under any house in any court within the limits of the special Act, after the Commissioners have given notice to the owners thereof that the letting of cellars as dwelling-places in such court is prohibited from that time forth.

As to Cellar Dwellings.

Section 114.—It shall not be lawful to let separately, except as a warehouse or storehouse, or to suffer to be occupied as a dwelling-place, any cellar or room under any house within the said limits, although not situated in a court, which cellar or room shall be less in height from the floor to the ceiling than seven feet, or which shall be less than one-third of its height from the floor to the ceiling than seven feet, or which shall be less than one-third of its height above the level of the street or ground adjoining the same, or otherwise shall not have two feet at least of its height from the floor to the ceiling above the said level, with an open area of two feet wide, which shall not have appurtenant thereto the use of a water-closet, or privy, and ash-pit, according to the enactment herein contained, or which shall not have also a glazed window made to open to the full extent of the half thereof, the area of which is not less than six feet clear of the frame, and a fire-place with a chimney or flue; or which cellar, being an inner or back cellar, let or occupied along with the front cellar, as part of the same letting or occupation, has not a ventilating-flue (unless such inner or back cellar shall be part of a house built before the passing of the special Act), or which shall not be well and effectually drained by means of a drain, the bottom of which is one foot at least below the level of the floor of such cellar or room.

METROPOLIS' LOCAL MANAGEMENT ACT, 1855.
(18 and 19 Vict. c. 120.)

As to Cellars.

Section 103.—Any room of a house the surface of the floor of which room is more than three feet below the surface of the footway of the adjoining street, and any cellar whose back room or cellar is or has been occupied separately as a dwelling, at or before the time of the passing of this Act, may continue to be so let or occupied if it possesses the following requisites (that is to say):—

If there be an area not less than three feet wide in

every part from six inches below the floor of such room or cellar to the surface or level of the ground adjoining to the front, back, or external side thereof, and extending the full length of such side;

If such area to the extent of at least five feet long and two feet six inches wide be in front of the window of such room or cellar, and be open, or covered only with open iron gratings;

If there be in every such room or cellar an open fire-place, with proper flue therefrom;

If there be a window opening of at least nine superficial feet in area, which window opening must be fitted with a frame filled in with glazed sashes, of which, at the least, four superficial feet and a half must be made to open for ventilation;

And no such room nor any cellar not so let or occupied as aforesaid at or before the time of the passing of this Act shall be so let or occupied unless it possesses the following requisites (that is to say):—

Unless the same be in every part thereof at least seven feet in height, measured from the floor to the ceiling;

Unless the same be at least one foot of its height above the surface of the footway of the street adjoining or nearest to the same;

Unless there be outside of and adjoining the said room or cellar, and extending along the entire frontage thereof, and upwards, from six inches below the level of the floor thereof, up to the surface of the said footway, an area at least three feet wide in every part;

Unless the same be effectually drained and secured against the rise of effluvia from any sewer or drain;

Unless there be appurtenant to such room or cellar the use of a water-closet, or privy, and an ash-pit, furnished with proper doors and coverings, kept and provided according to the provisions of this Act;

Unless the same have a fire-place with a proper chimney or flue;

Unless the same have an external glazed window of at

least nine superficial feet in area, clear of the frame, and made to open in such manner as is approved by the surveyor of the Metropolitan Board of Works:

Provided always that in any area adjoining a room or cellar there may be placed steps necessary for access to such room or cellar, and over or across any such area there may be steps necessary for access to any building above the room or cellar to which such area adjoins, if the steps in such respective cases be so placed as not to be over or across any such external window;

And whosoever lets, occupies, or continues to let, or knowingly suffers to be occupied, any room or cellar contrary to this Act shall be liable for every such offence to a penalty not exceeding twenty shillings for every day during which the same continues to be so let or occupied.

Section II.

VENTILATION.

No defined mode of ventilation has been prescribed by law for dwelling-houses, except in reference to the basement rooms or cellar-dwellings just quoted; but in the Towns' Improvement Clauses Act, 1847, Section 110, there is a regulation in reference to the ventilation of public buildings as follows:—

Towns' Improvement Clauses Act, 1847.

(10 & 11 Vict. c. 34.)

Ventilation of Public Buildings.

Section 110.—Before beginning to build any building intended to be used as a church, chapel, or school, or a place of public amusement or entertainment, or for holding large numbers of people for any purpose whatsoever within the limits of the special Act, the person intending to hold the same shall give fourteen days' notice in writing to the Commissioners, and shall accompany such notice with a plan and description of the manner proposed for its construction,

with respect to the means of supplying fresh air to such building; and no person shall begin to build such building until the manner proposed for its construction with respect to the means for supplying fresh air have been approved by the Commissioners.

The public mind is becoming awakened to the desirability of ventilation in private dwellings, and many architects are adopting some scheme for that purpose in new houses of the higher class. We may hope that, during this generation, the doctrine that fresh air in houses is as necessary to health as good food and water will have a practical application, even in the houses of the poor.

The fundamental principle is that means of ventilation should be provided, besides the doors, windows, and smoke-flues; but care must be taken lest, by so doing, houses are made too cold and, possibly, too damp for the health of the children and the aged. The subjects of ventilation and warmth are commonly opposed in this climate, and it is not an easy task to reconcile them in a manner consistent with perfect health.

It is evident that, whatever means of ventilation may be adopted, they will require modification with many circumstances, including the construction of the house, number of inmates, cleanliness, locality as affected by exposure to the winds and the sun, and perhaps, above all, to external temperature at different seasons of the year. So far, therefore, it may be inferred that the same system would produce very various results.

Again, the necessity for warmth often exceeds that for ventilation, as, for example, with the very young and old, and with defect of firing, clothing, and food, so that the same system will produce different effects on different persons. Add to

these reasons for cautious action the facts that the necessity for ventilation is still so imperfectly understood that many object to it, and that there are many different opinions as to the proper mode of effecting it, and we find reasons rather for deliberation and deference than for dogmatism.

No houses should be built which have not external walls with windows or doors on two sides, and, if possible, on opposite sides, viz. front and back.

The windows in every room should be made to open over a part of their surface.

No inhabited room should be without a chimney-flue, or some opening for the inlet and exit of air.

The special means of ventilation are very numerous, and we will briefly refer to the more important and economical :—

Openings through external and internal walls at the ceiling-level, and in bedrooms at the floor-level also, so arranged that they may cause a current of air across the room. As those in external walls will be influenced by the force of the movement of the external air, it is necessary that there should be means of modifying the rate at which the air will pass through them. Such are simply perforated zinc with holes, say one-twentieth of an inch in diameter, placed on the inside, whilst on the outside there will be a degree of impediment offered to the entrance of the air by the air-brick or iron grating. The impediment thus offered on the inside may be so great as to almost nullify the utility of the apparatus; but the effect will be greater when the wind blows into them. The size and number of such ventilators will vary with the construction and position of the room, but one, or perhaps two, in a wall twelve to fourteen feet in

length will suffice. This kind of ventilation has the advantage of permanency, and will act night and day, whilst it is exceedingly simple and economical.

There are ventilators to be placed in similar openings which may be closed at pleasure, as Sherringham's; but they require the interference of some one to regulate them. Others, as Arnott's, are fitted with a very light valve, which remains closed in the absence of any current, and open when there is a current. It is thus self-regulating, but not necessarily always acting.

Perforated tubes or cornices have been devised, by which the air admitted at such an opening is distributed over distant parts of the room, and some of these have two chambers, through one of which there is an inlet, and through the other an outlet. They are said to effect ventilation without perceptible draught.

Such external openings are frequently connected with an ascending air flue, into which they enter directly or at an angle, and from which they communicate with the room by a grating at some other elevation. The same flue is used for the like purpose in the perpendicular series of rooms to the roof, and is used chiefly for the supply of air from the outside; but when the temperature of the room is much higher than that of the outer air, a current will also set from within outwards.

Ventilating gas-burners are also connected with such external openings for the supply of air from without, and with an opening in the chimney stack for the escape of heated air, and are of great value.

The upper sash is let down from half an inch to an inch, or an opening is left above the sash to the same extent, or the

upper rail of the sash is cut out so as to allow the introduction of air through it. With all these methods perforated zinc or wire gauze is used, and in the former it is stretched across the opening of the window, on the outside or inside, whilst in the latter it is let into the sash. Where the top of the window is nine or ten feet above the floor, this method does not create an injurious draught, and is very simple and inexpensive.

Ventilation implies both inlets and outlets for air, which in size must have a relation to each other. Whenever fire is burning, a large quantity of air passes out of the room, and at least an equal quantity must be admitted. Hence openings in the inner or outer wall leading to the grate, or a portion cut out of the top of the door, or behind the architrave of the door, will be required if there be no other means of ingress in constant operation.

Where there are two smoke flues in the same room, or in two communicating and not separated rooms, there will be a down-current in one of them if there be a fire in the other, and if an insufficient quantity of air be admitted in other ways.

Special air-flues are constructed by the side of the smoke-flues, and gratings are inserted into their walls from the rooms through which they pass. Air will ascend in them in proportion as the temperature of the air inside them or in the rooms is much higher than that of the external air, and therefore the degree of their action will vary extremely; but if an Archimedean screw ventilator be placed at the top of such a flue, there will be an ascending current so long as there is movement of the wind to keep the ventilator in motion. Such a flue may pass from each room.

Both of these plans are exceedingly valuable in houses, but the latter is to be preferred.

A perfectly artificial system of ventilation is perhaps the most effectual, but it must be well planned, as in that by Mr. Dewsbury, at the Mickleover Asylum, near Derby, or at the Houses of Parliament.

It implies that means are taken to supply air to and to remove used air from each room by some constantly and efficiently operating cause, as that of heat, and that the whole is effected by special channels in a defined direction and with proper openings. In the Houses of Parliament the motor power is a large open fire near to the roof of a ventilating tower, whilst in other places a tank of hot water is used for the same purpose.

This plan is necessarily costly in construction and maintenance, and is adapted only to private dwellings of a high class; but with the general practice of distributing hot water throughout houses of the middle classes the cost of maintenance need not now deter architects from the adoption of it. Moreover, it is quite possible to supply warm air by the fire-grate, and thus to reduce the sensation of a draught to a minimum.

But whatever may be the plan of ventilation adopted, it is essential that the temperature of the room be not lowered too much, and that currents of cold air be not too perceptible. It will often overcome objection if the means of ventilation are not readily seen, and if the supply of air to a room be in excess of that which is removed, so that the movement of the air may be reduced as low as possible.

The Legislature has not afforded any help to the medical officers of health in fulfilling this duty in churches, chapels,

and large public buildings, but has devolved upon them the difficult task of judging for themselves, and has simply required that the plans shall be submitted for their approval. The ventilation of such buildings is as imperfect as that of private dwellings, and the subject handled in a practical manner is well worthy the attention of the adviser of the local authorities.

It is clear that a very large and lofty room should have means of ventilation at more than one level, as, for example, at that of the roof, and must provide for the removal of the air, heated and deteriorated by the combustion of gas, which will be chiefly in the upper part of the room, and of that which is deteriorated and also slightly heated by the respiration of man, which will be chiefly in the lower part. The former is very efficiently removed by the aid of sun-burners with large flues over them, on the top of which is the Archimedean screw ventilator, as we have effected in Trinity Church, Marylebone; but the latter must be remedied by external openings underneath the galleries, or at elevations from twelve to twenty feet, and in such cases the distribution of air by perforated tubes or channels is very desirable. The inlet of air cannot be properly restricted to the doors, since in cold weather they are shut after the commencement of the service or performance, and must be provided for otherwise, in sufficient quantity. This is the most conveniently effected by using warmed air, and distributing it in various parts of the floor. With such an arrangement the warm air would ascend, and, carrying the foul air with it, would pass out by the external ventilators in the sides of the building or in the roof.

The artificial system of ventilation already described should however be generally adopted in large buildings, and be so constructed that a known minimum quantity of air may pass through it per minute. The supply of warm and fresh air would be provided from the floor, and the exit of used air by openings in the walls, pillars, and roof. Special consideration is required where there are galleries, lest the air, rendered foul by both respiration and combustion, should accumulate underneath, but air-flues with openings under the galleries, or a connection between the spaces under and above the gallery, if perfectly effected, would in a great degree overcome the difficulty.

The approximate estimation of the quantity of air passing through a room may be readily made wherever the inlets and outlets can be kept under control by placing anemometers in openings of known area, and determining the rate at which the current moves. If this linear discharge be multiplied by the section area expressed in feet and decimals of a foot, the cubical discharge will be ascertained. If the discharge per second be multiplied by 3600, it will give the quantity per hour. This must be adopted at every opening in the room, since the rate will vary with each, although the area may be constant, but a mean of all of the same area may be taken. It is, however, clear that such openings should be influenced by conditions which are constant, as those of flues with a special motor power, and not those which are variable as the movement of the external air, and it is therefore adapted only, to a well organised system of artificial ventilation. Moreover, under ordinary circumstances the doors of rooms admit an unknown quantity of air, by reason of their use, and both

doors and windows, when closed, are in some degree ventilators. The quantity of air which should pass through a room depends upon the cubical space allotted to each inmate, and the combustion of the air in the production of artificial light. The required cubical space has been defined to be 240 cubic feet for each person in a common lodging-house, and about 300 cubic feet in factories and workshops. The space required for each adult on an emigrant ship is fifteen feet on the floor, and a height of not less than six feet, and even that includes hospital space.

In workhouses the following regulations were laid down by the Poor Law Board as to rooms from ten to twelve feet in height :—

(No. 3.)

	Floor Space.		
	Day Rooms.	Schools.	Bed Rooms.
Healthy—	Square feet.	Square feet.	Square feet.
Adults	15 to 20	—	36
Children	6 to 12	8 to 12	22½ to 31½
Sick Adults—			
Ordinary diseases	15 to 20	—	60
Fever and lying-in	36 to 80	—	80

When these figures are multiplied by ten or twelve feet, according to the height of the room, the cubical space in feet is obtained.

These quantities are to be allotted to each bed apart from any spaces required for doors and fire-places; but in the metropolitan district the measurement is taken over the whole capacity of the ward, on the recommendation of the Cubic Space Committee; and for the ordinary sick it is 850 cubic feet, which is assumed to be equal to 720 cubic feet measured on the former plan. In the same district the

space which may be allotted on the like plan of measurement to a lying-in case is 1500 cubic feet, and to a fever case 2000 cubic feet—quantities which exceed the average amount obtained in general hospitals throughout the country.

It is very evident that the degree in which the air is changed will materially influence the cubical space required, and true economy demands that the air shall be renewed as often as can be reasonably effected. Calculations have been made with a view to show how much air must be passed through a room in order to maintain a nearly uniform composition, notwithstanding the vitiating effects of respiration and combustion. It is based upon the amount of carbonic acid which is emitted by each person, or produced by a candle or gas-burner. If the former be taken at ten grains per minute, or 32·9 oz. avoirdupois in the twenty-four hours, it will be a sufficient estimation for an adult man staying in a house. As a general expression it may be stated that during respiration the air loses by volume from four to five per cent. of oxygen, and gains from three to four per cent. of carbonic acid. Thus (Foster):—

(No. 4.)

	Oxygen.	Nitrogen.	Carbonic Acid.
Atmospheric air .	20·81 .	79·15 .	0·04
Expired air . .	16·033 .	79·557 .	4·380

Half a pound of tallow candles will yield about 2690 grains of carbon, or 9863 grains of carbonic acid, being 12·044 cubic feet at 60° Fahr., or as much carbonic acid as would be expired by a man at the above calculation in more than fourteen hours. Somewhat more than eleven and a half ounces of candles would produce as much carbonic acid as a man at rest during twenty-four hours.

Every pound of coal burnt consumes the oxygen of 150 cubic feet of air, and in making gas, if there be one per cent. of sulphur in the coal, there will be 0·46 grains in a cubic foot of the smoke, or 0·92 of sulphurous acid—nearly one grain of sulphurous acid in a foot of smoke. When, however, air is supplied in larger quantity, the proportion in 100 cubic feet will be less.

But whatever may be the source of the carbonic acid, if the amount be known, there is no difficulty in determining the quantity of air which will be required to maintain a fixed percentage in the air to be respired. Dr. Angus Smith has the following observations on this point:—

It is often asked, How often must we renew the air of a place in order to keep up the purity at a given point? The first column of this table gives the amount per cent. of carbonic acid which we may suppose to be maintained for any purpose in the air, the other columns the amount of air required in order that the amount of carbonic acid should not be exceeded.

(No. 5.)

AMOUNT OF PURE AIR REQUIRED PER HOUR, IN CUBIC FEET.

Carbonic Acid per Cent.	For a Man.	For a Candle.	For a Man and Candle together.
0·4	100	50	150
0·3	133	66	200
0·25	160	80	240
0·2	200	100	300
0·1	400	200	600
0·09	444	222	666
0·08	500	250	750
0·07	571	286	857
0·06	665	333	1000
0·05	800	400	1200
0·04	1000	500	1500
0·03	1333	666	1999
0·02	2000	1000	3000

If a man brings 100 cubic feet of air to contain 0·4 per cent. of carbonic acid in an hour from zero, he will bring 1000 cubic feet up to 0·04 in the same time, and he will, therefore, at the end of the hour be ready for another 1000 cubic feet of air to prevent the amount exceeding the proposed limit. But if the air which is supplied contains already 0·04 per cent. of carbonic acid, he will not be able to keep the air of the space so pure. Let us suppose that he chooses for his limit 0·06—that is, 0·02 higher than that which he receives as fresh—he will bring 2000 cubic feet up to that in an hour, and this will be the constant supply wanted. The table will, therefore, do for that condition equally well; we only require to look at 0·02 above the air of the place, and we see 2000 feet stand opposite it.

If this is correct, the amount of air required for ventilation will depend on the quality of air supplied. Let us take a manufacturing town with 0·04 of carbonic acid and ventilate 1000 cubic feet. A man will bring the air up to 0·08 in an hour, he will then require another 1000 if he does not allow it to go higher, or if he prefers it to stop at 0·06, he will require 2000.

(No. 6.)

AMOUNT OF AIR CONTAINING 0·04 PER CENT. CARBONIC ACID—SAY TOWN AIR—REQUIRED PER PERSON PER HOUR.

	Cubic Feet.
To keep air at 0·05	4000
,, ,, 0·06	2000
,, ,, 0·08	1000
,, ,, 0·10	666
,, ,, 0·12	500
,, ,, 0·14	400
,, ,, 0·16	333
,, ,, 0·18	286
,, ,, 0·20	250

But let us suppose the air to contain only 0·032 per cent. of carbonic acid, we do not require so much.

To keep air at 0·05, subtract 0·032, and we have 0·018, which is used to divide 0·40, giving us 22·22, which multiplied by 100 = 2222 cubic feet.

As some persons put down 0·6 as the amount of carbonic acid produced in 100 cubic feet of air in an hour, column ii. is added for that mode of calculation. If this amount be general, all the quantities would require to be increased in the same ratio, but I go by my own experiments.

(No. 7.)

CUBIC FEET OF AIR CONTAINING 0·032 PER CENT. CARBONIC ACID, REQUIRED PER PERSON PER HOUR WHEN 0·4 IS PRODUCED IN 100 CUBIC FEET PER HOUR, AND WHEN 0·6 IS PRODUCED.

	I. When 0·4 is produced.	II. When 0·6 is produced.
To keep air at 0·05	2222	3333
,, ,, 0·06	1428	2142
,, ,, 0·08	833	1250
,, ,, 0·10	588	882
,, ,, 0·12	454	681
,, ,, 0·14	370	555
,, ,, 0·16	312	468
,, ,, 0·18	270	405
,, ,, 0·20	238	357

When the ventilation is desired to be very good, the amount required when very pure air is supplied is much less than with imperfect air. As the demands become less, the difference diminishes. If ozone were taken into consideration, the difference would probably be much greater; but I do not know what allowance to make for that body, and have left it out of consideration. In the smoky towns there is *none* at all.

The subject of warming houses is intimately connected with that of ventilation, for if cold air be admitted by the latter, the heat of the air in the room must be lessened, whilst with warm air warmth and ventilation may proceed *pari passu* and mutually aid each other.

The method in universal use in this country is that of open fires, by which much heat is lost in the smoke-flue,

and the remainder is but imperfectly distributed in the room, but its cheerfulness as a fire and its utility as a ventilator are more influential than the objections on the ground of expense. With increased cost of coal it is however certain that some modification of the system must be effected, and heat generated and distributed at a less cost. This is at present in operation in a very limited degree by the system of hot-water distribution with which stacks of pipes are connected, and adapted to warm the hall or a room, and although this has not yet been extended to small houses, the building of blocks of such houses under one management will render it practicable. In such a case one arrangement for the warming of the water or the air for all the houses would suffice, and the distribution might be made in defined proportions to the several rooms or houses.

The chief sanitary difficulties to be overcome in this system of ventilation are the regulation of the temperature and the prevention of an undue dryness of the air. With an internal temperature above 62° or 64° there would be danger of increasing the sensibility of the skin, so that exposure to the cold external temperature of winter would be followed by disease, whilst other evils indicated by debility might arise.

The air becomes relatively drier as the temperature increases, since its capacity for the reception of moisture increases with it, and hence the quantity of moisture required to produce saturation of the air increases with the temperature. The table on the next page will be found useful :—

(No. 8.)

WEIGHT IN GRAINS OF A CUBIC FOOT OF VAPOUR, UNDER THE PRESSURE OF 30 INCHES OF MERCURY FOR EVERY DEGREE OF TEMPERATURE FROM 0° TO 100°.

Temp. Fahr.	Weight in Grains of a Cubic Foot of Vapour.	Temp. Fahr.	Weight in Grains of a Cubic Foot of Vapour.	Temp. Fahr.	Weight in Grains of a Cubic Foot of Vapour.	Temp. Fahr.	Weight in Grains of a Cubic Foot of Vapour.
o	Grs.	o	Grs.	o	Grs.	o	Grs.
32	2·13	50	4·10	67	7·27	84	12·40
33	2·21	51	4·24	68	7·51	85	12·78
34	2·30	52	4·39	69	7·76	86	13·17
35	2·48	53	4·55	70	8·01	87	13·57
36	2·48	54	4·71	71	8·27	88	13·98
37	2·57	55	4·87	72	8·54	89	14·41
38	2·66	56	5·04	73	8·82	90	14·85
39	2·76	57	5·21	74	9·10	91	15·29
40	2·86	58	5·39	75	9·39	92	15·74
41	2·97	59	5·58	76	9·69	93	16·21
42	3·08	60	5·77	77	9·99	94	16·69
43	3·20	61	5·97	78	10·31	95	17·18
44	3·32	62	6·17	79	10·64	96	17·68
45	3·44	63	6·38	80	10·98	97	18·20
46	3·56	64	6·59	81	11·32	98	18·73
47	3·69	65	6·81	82	11·67	99	19·28
48	3·82	66	7·04	83	12·03	100	19·84
49	3·96						

Note.—The temperature is the dew-point, and the weight of vapour is the weight which can be sustained at that temperature without being visible.

SECTION III.

DRAINS AND DRAINAGE; PETTIES, AND OTHER ACCUMULATIONS OF FILTH.*

The drainage of houses is of the utmost importance to health, and has been the subject of many legislative enactments. The following are extracted from the Towns' Im-

* See also p. 181.

provement Clauses Act, 1847, and the Metropolis' Local Management Act, 1855, but the subject will be discussed at greater length under the following clause :—

Towns' Improvement Clauses Act, 1847.
(10 & 11 Vict. c. 34.)

Sewer trapped.

Section 33.—All sewers and drains within the limits of the special Act, whether public or private, shall be provided by the commissioners, or other persons to whom they severally belong, with proper traps or other coverings or means of ventilation so as to prevent stench.

Level to allow Drainage.

Section 36.—No house or building within the limits of the special Act shall be built upon a lower level than will allow of the drainage of the wash and refuse of such house or building into some sewer belonging to the commissioners either then existing or marked out upon the map hereinbefore directed to be made by them, or into the sea.

Privy.

Section 43.—The owner of any such house shall provide the same with a privy, with such door and covering of the same, and with such ash-pit as aforesaid, to the satisfaction of the commissioners, within one month next after notice in writing for that purpose given by the commissioners to him or the occupier of the house.

Stagnant Water in Cellars. Overflow of Cesspool.

Section 99.—No person shall suffer any waste or stagnant water to remain in any cellar or other place within the house belonging to or occupied by him, within the limits of the special Act, so as to be a nuisance; and every person who so suffers such water to remain forty-eight hours after receiving notice from the commissioners to remove the same, and every person who allows the contents of any privy or cesspool to overflow, or soak therefrom, to the

annoyance of the occupiers of any adjoining property, shall for every offence be liable to a penalty not exceeding forty shillings, and to a further penalty not exceeding five shillings for every day during which such nuisance continues.

METROPOLIS' LOCAL MANAGEMENT ACT, 1855.
(18 & 19 Vict. c. 120.)

Drained Houses.

Section 75.—If any house or building, whether built before or after the commencement of this Act, shall within any such parish or district be found not to be drained by a sufficient drain communicating with some sewer and emptying itself into the same to the satisfaction of the vestry or board of such parish or district, and if a sewer of sufficient size be within one hundred feet of any part of such house or building on a lower level than such house or building, it shall be lawful for the vestry or board, at their discretion, by notice in writing, to require such owner of such house or building forthwith or within such reasonable time as may be approved by the vestry or board to construct and make such house or building into any such sewer a covered drain, and such branches thereto, of such materials, of such size, at such level, and with such fall, as shall be adequate for such house or building and its several floors or stories, and also of its areas, water-closets, privies, and offices (if any), and for conveying the soil drainage and wash therefrom into the said sewer, and to provide fit and proper paved or impermeable sloped surfaces for carrying surface water thereto, and fit and proper sinks, and fit and proper syphoned or otherwise trapped inlets and outlets for hindering stench therefrom, and fit and proper water supply and water supplying pipes, cisterns, and apparatus for scouring the same, and for causing the same to convey away the soil, and fit and proper sand-traps, expanding inlets, and all other apparatus for hindering the entry of improper substances therein.

Water-closet, Privy, &c.

Section 81.—After the commencement of this Act it shall not be lawful newly to erect any house or rebuild any house

pulled down to the extent aforesaid within any parish mentioned in Schedule (A) to this Act, or any district mentioned in Schedule (B) to this Act, without a sufficient water-closet or privy and ash-pit furnished with proper doors and coverings, and also furnished as regards the water-closet with suitable water supply and water supply apparatus and with suitable trapped soil-pan and other suitable works and arrangements.

Inspection of Drain, Water-closet, &c.

Section 82.—It shall be lawful for any such vestry or board, or for their surveyor or inspector or such other person as they appoint, to inspect any drain, water-closet, privy, cesspool, or water supply or sinks, traps, syphons, pipes, and other works or apparatus connected therewith, within the parish or district of such vestry or board, and for that purpose at all reasonable times in the daytime.

COMMON LODGING-HOUSES ACT, 1851.

(14 & 15 Vict. c. 28.)

As to cleansing Common Lodging-houses.

Section 13.—The keeper of a common lodging-house shall thoroughly cleanse all the rooms, passages, stairs, floors, windows, doors, walls, ceilings, privies, cesspools, and drains thereof to the satisfaction of and so often as shall be required by or in accordance with any regulation or by-law of the local authority, and shall well and sufficiently and to the like satisfaction limewash the walls and ceilings thereof in the first week of each of the months of April and October in every year.*

SECTION IV.

PERSONAL HABITS OF THE PEOPLE.

None can doubt that the personal habits of the people exert a great influence over public and private health. Want of cleanliness of the person, house, utensils, and yard,

* See also p. 144.

lead to the production and continuance of fevers. An undue consumption of intoxicating liquors leads to disease and poverty, and usually goes *pari passu* with defective nourishment. Idleness, ignorance, debauchery bring want, vice, and crime.

Hence, as good or bad personal habits abound, so will be the causes of disease and the necessity for watchfulness on the part of the sanitary authorities.

It is desirable under this head to refer briefly to the Contagious Diseases Acts, for, in certain localities, the diseases which they are intended to abate exert no little influence upon public health.

The first Act was passed in 1864 (27 & 28 Vict. c. 85), but was of temporary duration, and in 1866 a permanent Act was issued (29 & 30 Vict. c. 35), which contains nearly all the important provisions which are now in force. Two short amending Acts were, however, passed in 1868 and 1869 (31 & 32 Vict. c. 80, and 32 & 33 Vict. c. 96). They have not been applied to the whole country, but are strictly limited to certain localities where there are many sailors and soldiers. They are not placed under the superintendence of medical officers of health, but the Admiralty and the Secretary of State for War have power to appoint visiting surgeons and inspectors. As, however, the diseased women may be treated in certified hospitals other than military and naval, they will often come under the cognisance of medical officers of health; and since such women, when at large, may infect civil as well as military men, officers entrusted with the supervision of public health are interested in the operation of these Acts.

The following are extracts from the Acts referred to:—

THE CONTAGIOUS DISEASES ACT, 1866.
(29 VICT. c. 35.)

PERIODICAL MEDICAL EXAMINATIONS.

On Information, Justice may issue Notice to Woman who is a Common Prostitute.

Section 15.—Where an information on oath is laid before a justice by a superintendent of police, charging to the effect that the informant has good cause to believe that a woman therein named is a common prostitute, and either is resident within the limits of any place to which this Act applies or, being resident within five miles of those limits, has, within fourteen days before the laying of the information, been within those limits for the purpose of prostitution, the justice may, if he thinks fit, issue a notice thereof addressed to such woman, which notice the superintendent of police shall cause to be served on her.

Provided that nothing in this Act contained shall apply or extend in the case of Woolwich, to any woman who is not resident within one of the parishes of Woolwich, Plumstead, or Charlton.

Power to Justice to Order Periodical Medical Examination.

Section 16.—In either of the following cases, namely:—

If the woman on whom such a notice is served appears herself, or by some person on her behalf, at the time and place appointed in the notice, or at some other time and place appointed by adjournment;

If she does not so appear, and it is shown (on oath) to the justice present that the notice was served on her a reasonable time before the time appointed for her appearance, or that reasonable notice of such adjournment was given to her (as the case may be):

The justice present, on oath being made before him substantiating the matter of the information to his satisfaction, may, if he thinks fit, order that the woman be subject to a

periodical medical examination by the visiting surgeon for any period not exceeding one year, for the purpose of ascertaining at the time of each such examination whether she is affected with a contagious disease; and thereupon she shall be subject to such a periodical medical examination, and the order shall be a sufficient warrant for the visiting surgeon to conduct such examination accordingly.

The order shall specify the time and place at which the woman shall attend for the first examination.

The superintendent of police shall cause a copy of the order to be served on the woman.

Voluntary Submission by Woman.

Section 17.—Any woman, in any place to which this Act applies, may voluntarily, by a submission in writing signed by her in the presence of and attested by the superintendent of police, subject herself to a periodical medical examination under this Act for any period not exceeding one year.

Power to make Regulations as to Examinations.

Section 18.—For each of the places to which this Act applies, either the Admiralty or the Secretary of State for War (but not both for any one place) may, from time to time, make regulations respecting the times and places of medical examinations under this Act at that place, and generally respecting the arrangements for the conduct there of those examinations; and a copy of all such regulations from time to time in force for each place shall be sent by the Admiralty or the Secretary of State for War (as the case may be) to the clerk of the peace, town clerk (if any), clerk of the justices, visiting surgeon, and superintendent of police.

Visiting Surgeon to prescribe Times, &c.

Section 19.—The visiting surgeon, having regard to the regulations aforesaid, and to the circumstances of each case, shall at the first examination of each woman examined by him, and afterwards from time to time as occasion requires, prescribe the times and places at which she is required to attend again for examination; and he shall from time to

time give or cause to be given to each such woman notice in writing of the times and places so prescribed.

DETENTION IN HOSPITAL.

Certificate of Visiting Surgeon.

Section 20.—If on any such examination the woman examined is found to be affected with a contagious disease, she shall thereupon be liable to be detained in a certified hospital subject and according to the provisions of this Act, and the visiting surgeon shall sign a certificate to the effect that she is affected with a contagious ditease, naming the certified hospital in which she is to be placed; and he shall sign that certificate in triplicate, and shall cause one of the originals to be delivered to the woman, and the others to the superintendent of police.

Placing in Certified Hospital for Treatment.

Section 21.—Any woman to whom any such certificate of the visiting surgeon relates may, if she thinks fit, proceed to the certified hospital named in that certificate, and place herself there for medical treatment, but if after the certificate is delivered to her she neglects or refuses to do so, the superintendent of police, or a constable acting under his orders, shall apprehend her, and convey her with all practicable speed to that hospital, and place her there for medical treatment, and the certificate of the visiting surgeon shall be a sufficient authority to him for so doing.

The reception of a woman in a certified hospital by the managers or persons having the control or management thereof shall be deemed to be an undertaking by them to provide for her care and treatment, lodging, clothing, and food, during her detention in the hospital.

Detention in Hospital.

Section 22.—Where a woman certified by the visiting surgeon to be affected with a contagious disease places herself, or is placed as aforesaid, in a certified hospital for medical treatment, she shall be detained there for that purpose by the chief medical officer of the hospital until discharged by him by writing under his hand.

The certificate of the visiting surgeon, one of the three originals whereof shall be delivered by the superintendent of police to the chief medical officer, shall, when so delivered, be sufficient authority for such detention.

Power to Transfer to another Certified Hospital.

Section 23.—The inspector of certified hospitals may, if in any case it seems to him expedient, by order in writing signed by him, direct the transfer of any woman detained in a certified hospital for medical treatment from that certified hospital to another named in the order.

Every such order shall be made in triplicate, and one of the originals shall be delivered to the woman and the others to the superintendent of police.

Every such order shall be sufficient authority for the superintendent of police or any person acting under his orders to transfer the woman to whom it relates from the one hospital to the other, and to place her there for medical treatment; and she shall be detained there for that purpose by the chief medical officer of the hospital until discharged by him by writing under his hand.

The order of the inspector of certified hospitals, one of the originals whereof shall be delivered by the superintendent of police to the chief medical officer of the hospital to which the transfer is made, shall, when so delivered, be sufficient authority for such detention.

Limitation of Detention.

Section 24.—Provided always that any woman shall not be detained under any one certificate for a longer time than three months, unless the chief medical officer of the hospital in which she is detained, and the inspector of certified hospitals, or the visiting surgeon for the place whence she came or was brought, conjointly certify that her further detention for medical treatment is requisite (which certificate shall be in duplicate, and one of the originals thereof shall be delivered to the woman); and in that case she may be further detained in the hospital in which she is at the expiration of the said period of three months by the chief medical officer until discharged by him by writing under his hand; but so

that any woman be not detained under any one certificate for a longer time in the whole than six months.

Power for Woman Detained to Apply to Justice for Discharge.

Section 25.—If any woman detained in any hospital considers herself entitled to be discharged therefrom, and the chief medical officer of the hospital refuses to discharge her, such woman shall on her request be conveyed before a justice, who, if he is satisfied upon reasonable evidence that she is free from a contagious disease, shall discharge her from such hospital, and such order of discharge shall have the same effect as the discharge of the chief medical officer.

During Conveyance to Certified Hospital, &c., Woman Deemed to be in Legal Custody.

Section 26.—Every woman conveyed or transferred under this Act to a certified hospital shall, while being so conveyed or transferred thither, and also while detained there, be deemed to be legally in the custody of the person conveying, transferring, or detaining her, notwithstanding that she is for that purpose removed out of one into or through another jurisdiction, or is detained in a jurisdiction other than that in which the certificate of the visiting surgeon was made.

REFUSAL TO BE EXAMINED, ETC.

Punishment of Women for Refusing to be Examined, &c.

Section 28.—In the following cases, namely:—

If any woman subjected by order of a justice under this Act to periodical medical examination at any time temporarily absents herself in order to avoid submitting herself to such examination on any occasion on which she ought so to submit herself, or refuses or wilfully neglects to submit herself to such examination on any such occasion;

If any woman authorised by this Act to be detained in a certified hospital for medical treatment quits the hospital without being discharged therefrom by the chief medical officer thereof by writing under

his hand (the proof whereof shall lie on the accused);

If any woman authorised by this Act to be detained in a certified hospital for medical treatment, or any woman being in a certified hospital under medical treatment for a contagious disease, refuses or wilfully neglects, while in the hospital, to conform to the regulations thereof approved under this Act:

Then and in every such case such woman shall be guilty of an offence against this Act, and on summary conviction shall be liable to imprisonment, with or without hard labour, in the case of a first offence for any term not exceeding one month, and in the case of a second or any subsequent offence for any term not exceeding three months; and in the case of the offence of quitting the hospital without being discharged as aforesaid the woman may be taken into custody without warrant by any constable.

Effect of Order of Imprisonment for Absence, &c., from Examination.

Section 29.—If any woman is convicted of and imprisoned for the offence of absenting herself or of refusing or neglecting to submit herself to examination as aforesaid, the order subjecting her to periodical medical examination shall be in force after and notwithstanding her imprisonment, unless the surgeon or other medical officer of the prison, or a visiting surgeon appointed under this Act, at the time of her discharge from imprisonment, certifies in writing to the effect that she is then free from a contagious disease (the proof of which certificate shall lie on her), and in that case the order subjecting her to periodical medical examination shall, on her discharge from imprisonment, cease to operate.

Effect on Order of Imprisonment for quitting Hospital, &c.

Section 30.—If any woman is convicted of and imprisoned for the offence of quitting a hospital without being discharged, or of refusing or neglecting, while in a hospital, to conform to the regulations thereof as aforesaid, the certificate of the visiting surgeon under which she was detained in the hos-

pital shall continue in force, and on the expiration of her term of imprisonment she shall be sent back from the prison to that certified hospital, and shall (notwithstanding anything in this Act) be detained there under that certificate as if it were given on the day of the expiration of her term of imprisonment, unless the surgeon or other medical officer of the prison, or a visiting surgeon appointed under this Act, at the time of her discharge from imprisonment, certifies in writing to the effect that she is then free from a contagious disease (the proof of which certificate shall lie on her), and in that case the certificate under which she was detained, and the order subjecting her to periodical medical examination, shall, on her discharge from imprisonment, cease to operate.

Penalty on Woman Discharged Uncured conducting Herself as Prostitute.

Section 31.—If on any woman leaving a certified hospital a notice in writing is given to her by the chief medical officer of the hospital to the effect that she is still affected with a contagious disease, and she is afterwards in any place for the purpose of prostitution without having previously received from a visiting surgeon appointed under this Act a certificate in writing endorsed on the notice or on a copy thereof certified by the chief medical officer of the hospital (proof of which certificate shall lie on her) to the effect that she is then free from a contagious disease, she shall be guilty of an offence against this Act, and on summary conviction before two justices shall be liable to be imprisoned with or without hard labour, in the case of a first offence for any term not exceeding one month, and in the case of a second or any subsequent offence for any term not exceeding three months.

DURATION OF ORDER.

Order to Operate whenever Woman is Resident in any Place where Order made, &c.

Section 32.—Every order under this Act subjecting a woman to periodical medical examination shall be in operation and enforceable, in manner in this Act provided, as long as and whenever from time to time the woman to whom

it relates is resident within the limits of the place to which this Act applies wherein the order was made, or within five miles [*now ten miles*] of those limits, but not in any case for a longer period than one year; and where the chief medical officer of a certified hospital, on the discharge by him of any woman from the hospital, certifies that she is free from a contagious disease (proof of which certificate shall lie on her), the order subjecting her to periodical medical examination shall thereupon cease to operate.

RELIEF FROM EXAMINATION.

Application for Relief from Examination.

Section 33.—If any woman subjected to a periodical medical examination under this Act (either on her own submission or under the order of a justice), desiring to be relieved therefrom, and not being under detention in a certified hospital, makes application in writing in that behalf to a justice, the justice shall appoint by notice in writing a time and place for the hearing of the application, and shall cause the notice to be delivered to the applicant, and a copy of the application and of the notice to be delivered to the superintendent of police.

Order for Relief from Examination on Discontinuance of Prostitution, &c.

Section 34.—If on the hearing of the application it is shown, to the satisfaction of a justice, that the applicant has ceased to be a common prostitute, or if the applicant, with the approval of the justice, enters into a recognisance, with or without sureties, as to the justice seems meet, for her good behaviour during three months thereafter, the justice shall order that she be relieved from periodical medical examination.

Forfeiture of Recognisance by Return to Prostitution.

Section 35.—Every such recognisance shall be deemed to be forfeited if at any time during the term for which it is entered into the woman to whom it relates is (within the limits of any place to which this Act applies) in any public

thoroughfare, street, or place for the purpose of prostitution, or otherwise (within those limits) conducts herself as a common prostitute.

PENALTIES FOR HARBOURING, ETC.

Penalties for permitting Prostitute having Contagious Disease to Resort to any House, &c. for Prostitution.

Section 36.—If any person, being the owner or occupier of any house, room, or place within the limits of any place to which this Act applies, or being a manager or assistant in the management thereof, having reasonable cause to believe any woman to be a common prostitute and to be affected with a contagious disease, induces or suffers her to resort to or be in that house, room, or place for the purpose of prostitution, he shall be guilty of an offence against this Act, and on summary conviction thereof before two justices shall be liable to a penalty not exceeding twenty pounds, or, at the discretion of the justices, to be imprisoned for any term not exceeding six months, with or without hard labour:

Provided that a conviction under this enactment shall not exempt the offender from any penal or other consequences to which he may be liable for keeping or being concerned in keeping a bawdy house or disorderly house, or for the nuisance thereby occasioned.

PROCEDURE, ETC.

Application of 11 & 12 *Vict. c.* 43, *and* 14 & 15 *Vict. c.* 93, *to this Act.*

Section 37.—All proceedings under this Act before and by justices shall be had in *England* according to the provisions of the Act of the session of the 11th and 12th years of Her Majesty (chapter 43), "to Facilitate the Performance of the Duties of Justices of the Peace out of Sessions within England and Wales with respect to Summary Convictions and Orders," and in *Ireland* according to the provisions of the Petty Sessions (Ireland) Act, 1851, as far as those provisions respectively are not inconsistent with any provision of this Act, and save that the room or place in which a justice sits to enquire into the truth of the statements contained in any information or application under

this Act against or by a woman shall not, unless the woman so desires, be deemed an open court for that purpose; and, unless the woman otherwise desires, the justice may, in his discretion, order that no person have access to or be or remain in that room without his consent or permission.

The Contagious Diseases Act, 1869.

(32 & 33 Vict. c. 96.)

Temporary Detention of Women.

Section 3.—Any woman who, on attending for examination or being examined by the visiting surgeon, is found by him to be in such a condition that he cannot properly examine her, shall, if such surgeon has reasonable grounds for believing that she is affected with a contagious disease, be liable to be detained in a certified hospital, subject and according to the provisions of the Contagious Diseases Acts, 1866 to 1869, until the visiting surgeon can properly examine her, so that she be not so detained for a period exceeding five days. The visiting surgeon shall sign a certificate to the effect that she was in such a condition that he could not properly examine her, and that he has reasonable grounds to believe that she is affected with a contagious disease, and shall name therein the certified hospital in which she is to be placed; and such certificate shall be signed and otherwise dealt with in the same manner, and have the same effect, except as regards duration, as a certificate under the principal Act.

If the reason that the visiting surgeon cannot examine the woman is that she is drunk, she may be detained upon an order of the visiting surgeon for a period not exceeding twenty-four hours in any place named in the order where persons accused of being drunk and disorderly or of offences punishable summarily are usually detained, and the gaoler or the keeper of such place shall upon the receipt of such order receive and detain the woman accordingly.

Notice by Justice to Woman being a Common Prostitute.

Section 4.—Where an information on oath is laid before a justice by a superintendent of police, charging to the effect

that the informant has good cause to believe that a woman therein named is a common prostitute, and either is resident within the limits of any place to which this Act applies or, being resident within ten miles of those limits, or having no settled place of abode, has, within fourteen days before the laying of the information, either been within those limits for the purpose of prostitution, or been outside of those limits for the purposes of prostitution in the company of men resident within those limits, the justice may, if he thinks fit, issue a notice thereof addressed to such woman, which notice the superintendent of police shall cause to be served on her:

Provided that nothing in the Contagious Diseases Acts, 1866 to 1869, shall extend, in the case of Woolwich, to any woman who is not resident within the limits specified in the first schedule to this Act.

Section 15 of the principal Act is hereby repealed, and the foregoing enactment in this section is substituted for it; provided that all proceedings taken and acts done under the section hereby repealed shall, notwithstanding, remain of full effect, and shall, if necessary, be continued as if they had been taken and done under this section.

Duration of Order.

Section 5.—Any order for subjecting a woman to periodical medical examination shall be in operation and enforceable as long as and whenever such woman is resident within ten miles of the limits of the place where the order was made, instead of within five miles, as prescribed by Section 32 of the principal Act.

Effect of Voluntary Submission by Women.

Section 6.—Where any woman, in pursuance of the principal Act, voluntarily subjects herself by submission in writing to a periodical medical examination under that Act, such submission shall, for all the purposes of the Contagious Diseases Acts, 1866 to 1869, have the same effect as an order of a justice subjecting the woman to examination; and all the provisions of the principal Act respecting the attend-

ance of the woman for examination, and her absenting herself to avoid examination, and her refusing or wilfully neglecting to submit herself for examination, and the force of the order subjecting her to examination after imprisonment for such absence, refusal, or neglect, shall apply and be construed accordingly.

Duration of Detention.

Section 7.—A woman may be detained for a further period not exceeding three months, in addition to the six months allowed under Section 24 of the principal Act, if such certificate as is required by that section (to the effect that her further detention for medical treatment is requisite) is given at the expiration of such six months; so, nevertheless, that any woman be not detained under one certificate for a longer time in the whole than nine months.

Custody of Orders of Discharge.

Section 8.—Where an order is made discharging a woman from any hospital, or where a certificate is given, under Section 30 of the principal Act, that a woman is free from a contagious disease, such order and certificate shall be delivered to the superintendent of police, and retained by him.

Application to Surgeon for Relief from Examination.

Section 9.—Any woman subjected, either on her own submission or under the order of a justice, to a periodical medical examination under the principal Act, who desires to be relieved therefrom, and is not under detention in a certified hospital, may make application in writing in that behalf to the visiting surgeon.

The visiting surgeon shall cause a copy of such application to be delivered to the superintendent of police, and if, after a report from such superintendent, he is satisfied by such report or other evidence that the applicant has ceased to be a common prostitute, may, by order under his hand, direct that she be relieved, and she shall thereupon be relieved, from periodical medical examination.

Such order shall be in triplicate; one copy shall be delivered to the woman, and two copies shall be delivered to the superintendent of police, who shall communicate one copy to the justice (if any) who made the order subjecting the woman to a periodical medical examination, or to his successor in office.

The provisions of this section shall be in addition to and not in substitution for the provisions of the principal Act for relieving a woman from examination.

Section V.

POVERTY.

Poverty is a very complex social problem, and a fruitful source of disease. It is commonly associated with ignorance of sanitary laws, and not unfrequently with personal habits which directly tend to injure health, whilst it implies deficiency of food, clothing, and warmth, with an almost entire absence of the comforts of life. Although public provision is made to avert starvation and to supply medical aid, none can doubt that the very poor suffer, not only from want of the necessaries of life, but from defective remedial aids in case of sickness. It may also be admitted that they occupy and overcrowd the worst class of houses, and the least salubrious localities.

The extent of this evil varies much in different localities with the season of the year and the general prosperity of the nation, but few are without it at all times, and probably all have it sometimes. Hence the degree in which it will cause disease varies much, but as such people are always upon the verge of it, the medical officer of health should devote his unremitting attention to them. A low state of the general health, with debility and indigestion,

and exposure leading to confirmed rheumatism are constant, whilst fevers occur yearly, and contagious diseases of all kinds are apt to spread among them.

Until deep poverty disappears or is extremely rare, we cannot hope for the extinction of fevers, nor limit their spread, and hence the whole community has an interest in diminishing this great calamity.

Whilst no member of such a household can be free from an unusual liability to disease, the evils fall chiefly upon the children and the women, bringing both disease and increased mortality. Even in agricultural districts, where the labourers' wages were 8*s.* a week a short time ago, the self-denial of the wife enabled the husband, as the bread-winner, to obtain some degree of sufficiency of food; but what must have been the want of herself and children under those circumstances? Hence the sanitary authorities should be ever on the watch as to the state of health of those members of a family who must suffer most.

Section VI.

CLIMATE AND TOPOGRAPHICAL INFLUENCES.*

The influence of locality in the production of disease is notorious, since the death-rate varies in different places. The problem is, however, a very complex one, and cannot as yet be solved in each of its parts: but one of the conditions, viz. density of population, has been investigated by Dr. Gairdner with very startling results in reference to England. Thus he shows by the following table that the

* See also "Meteorological Influences," page 165.

proportion of deaths is nearly doubled in the densest as compared with the sparsest population :—

(No. 9.)

DR. GAIRDNER ON DENSITY OF POPULATION IN RELATION TO MORTALITY IN ENGLAND.

Population on the Square Mile.	Deaths per 1000 of the Population.
56	15
106	16
144	17
149	18
182	19
202	20
220	21
324	22
485	23
1216	24
1262	25
2064	26
2900	27 and upwards.

The following tables, extracted from the last Annual Report of the Registrar-General, are of interest :—

(No. 10.)

AVERAGE ANNUAL RATE OF MORTALITY TO 1000 OF THE POPULATION IN THE ELEVEN DIVISIONS OF ENGLAND IN TEN YEARS, 1851–1860.

I. London	23·63
II. South Eastern Counties	19·55
III. South Midland Counties	20·44
IV. Eastern Counties	20·58
V. South Western Counties	20·01
VI. West Midland Counties	22·35
VII. North Midland Counties	21·10
VIII. North Western Counties	25·51
IX. Yorkshire	23·09
X. Northern Counties	21·99
XI. Monmouthshire and Wales	21·28

(No. 11.)

ANNUAL RATE OF MORTALITY PER 1000 IN TOWN AND COUNTRY DISTRICTS OF ENGLAND, 1859–1869.

	1861.	Mean Mortality.
Town—		Year . 24·47
In 142 districts and 56 sub-districts . .	Area, statute acres, 3,287,151 Population . . . 10,930,841	March . 27·23 June . 23·39 September 22·93 December 24·32
Country—		Year . 19·99
Small towns and country parishes . .	Area, statute acres, 34,037,732 Population . . . 9,135,383	March . 23·02 June . 20·32 September 18·88 December 17·16

(No. 12.)

POPULATION, MORTALITY, TEMPERATURE, AND RAINFALL IN ELEVEN CHIEF TOWNS, 1869.

	Population.	Deaths to 1000 living.	Temperature. °	Rainfall. Inches.
London . . .	3,170,754	24·66	49·6	23·92
Bristol . . .	169,423	24·22	49·6	34·74
Birmingham . .	360,846	21·51	—	—
Liverpool . .	509,052	29·06	49·0	29·68
Manchester . .	370,892	28·97	—	—
Salford . . .	119,350	26·75	48·1	35·43
Sheffield . .	239,750	27·58	48·3	30·31
Bradford . .	138,522	25·53	—	—
Leeds . . .	253,110	26·25	49·1	26·84
Hull . . .	126,680	25·37	—	—
Newcastle-on-Tyne .	130,503	26·10	—	—
Total . .	6,546,587	26·13	48·7	30·15

The topographical distribution of disease has recently been considered by many writers, and particularly by Mr. Haviland, who has published charts, coloured to show the mortality from Phthisis and diseases of the heart throughout England; whilst Drs. Bowditch and Buchanan have proved that

diminution of phthisis goes *pari passu* with improved drainage. The effect of marshy miasm in producing ague and other diseases needs no reference; but that of soils and subsoils as affecting health has not been so well established. There is a well-founded belief that clay soils tend to cause a damp and cold atmosphere, and thereby rheumatism and catarrh; and that porous soils, where there is filth running into them, are apt to generate fevers under the influence of heat. The primitive and metamorphic rocks and clay slates have a good repute, but generally the population upon them is not dense. The chalk formation, sandstones, and limestones, are commonly healthy, whilst the alluvial soils are more liable to induce disease from the presence of organic decomposing matters and defective drainage. The coal and ironstone formations cannot be unhealthy in themselves, but by reason of the habits of the people occupying them they do not show a low average of disease.

But whatever may be the nature of the subsoil, the degree of health depends much upon the configuration of the surface, so that low and flat or enclosed localities are relatively damp and cold in winter, and damp and hot in summer, and tend to rheumatism, phthisis, debility, and fever (particularly in the latter case, where there are great accumulations of dirt and decaying organic matter), whilst with great elevation and free exposure to light and air the inhabitants are more healthful, vigorous, industrious, and happy.

The elements which are essential to the solution of the problem are:—

1. Degree of exposure to prevalent winds and to sunlight.
2. Moisture of the atmosphere.
3. Porosity of the soil and subsoil. Conformation of

the surface and subsoil drainage by which superfluous water is carried away.

4. Retention of decomposing matters on the surface, or very near thereto.
5. The power to absorb and retain heat.

The power of rocks and soils to retain water, and to yield up moisture under the influence of heat, varies much, and is sometimes very great. Thus, whilst the primitive and metamorphic rocks will retain but about one pint in a cubic yard, it is said that loose sand may hold about two gallons in a cubic foot, or fifty-four gallons in a cubic yard. Even sandstone may retain one gallon per cubic foot, and clay 10 per cent. and light clay loam soil 20 to 30 per cent. of their weight.

The power to transmit water through soils varies extremely, as may be seen in the gravel on the one hand and clay on the other.

No element of climate exerts so great an influence over the general health as that of the amount of moisture in the atmosphere, since it affects directly the power to remove water from the system, and to regulate the temperature of the body. In hot climates a state of the air approaching to saturation is insufferable, and causes rapid death, whilst in temperate ones it slowly, but surely, lessens the vital actions, and induces a feeble tone of health and consumption. Such a condition is tolerable only in the coldest climates, where every effort is made to prevent loss of heat of the body by evaporation.

Moreover, in variable climates like our own a moist and a cold atmosphere is the poor man's *bête noir*, for it surely leads to rheumatism and bronchitis.

This condition is not necessarily due to the rainfall in a

particular locality, but rather to the retention of the water in the soil, by which it is returned by day and night to the atmosphere. We have already shown that this is partly attributable to the kind of soil, but yet more to the care taken by both surface and subsoil drainage to remove water from the surface, so that in an undrained locality there is a moist atmosphere with the consequent evils.

It is desirable that the attention of the medical officer of health in country districts should be especially called to this circumstance, and that he should inculcate upon the inhabitants the advantages to health which follow good drainage of the whole locality, and a drier state of the atmosphere. With this is necessarily associated the state of the roads and ditches of the locality; and although much attention has been given to them of late years, the latter are far too much neglected.

A house situate in a valley with water near to it on the same level may be unhealthy, and the inhabitants liable to consumption if young, and to nervous disorders if older. Moreover, such people are rarely equal in bodily vigour to those living on higher ground, and they seem to have a greater desire, if not need, for stimulating liquors.

The power of soils to absorb and retain heat varies very much, so that some are popularly known as "cold soils;" but it is the greatest in sand or sand and lime mixed soils, and very much less in clays and chalk. It is also much diminished by herbage, so that, whilst a tract of sand may be hot, a field of the same material covered with a thin green crop will be much cooler, and with a good crop of rye-grass will be cool.

Such are the chief influences which will engage the consideration of the medical officer of health under this clause,

and in reference to them he is to inform himself as far as practicable. This does not limit him to any particular mode of enquiry, nor free him from responsibility if he neglect any. He is not justified in waiting until some person, as the inspector of nuisances, brings him the information; neither is he to be satisfied with his general knowledge of the locality. He must make use of every means within his reach for the acquisition of information, and his efficiency will in a great measure go *pari passu* with it.

The general state of health of the district will in some degree be shown by the mortality in it, and by due examination he may determine the mortality in each part of it. The proportion of deaths to the whole population will give the means of comparing the mortality with other districts similarly situated, and the proportion to the inhabitants of particular parishes may give the like comparison between different parts of the same district, and in some degree point out causes which demand his attention.

There are not the means at present of ascertaining the amount of sickness occurring in any part of the country, but it is intended by the Legislature that this shall in future be ascertained, and thereby a true representation of the influences which affect, or threaten to affect, the public health injuriously will be within the reach of each medical officer of health.

The occurrence of particular diseases in a particular house or locality with undue frequency will lead the medical officer of health to ascertain what influences probably caused it, and at least to place him in the right path of enquiry. This will also be rendered more evident by the proportion in which women and children are attacked,

since they live more constantly within such influences than the men, who leave home for work elsewhere.

Still the deduction will not always be easy, for the problem will be complicated with poverty, or other conditions apart from the supposed particular sanitary influence, and it should be made cautiously, and, if possible, be based upon demonstration.

His own personal observations, although a very general guide, will, if correct, be not unimportant, at least so far as may relate to the general character of health, apart from actual disease of particular localities.

But beyond this actual basis of facts connected with the locality, the recorded experience of others on the effect of various influences must be allowed due weight; but, as the medical officer of health will be responsible for his own acts, he should satisfy himself on the validity of the conclusions arrived at by others. He must especially guard against two tendencies to error: viz. authority as represented by the opinions of others, and his own speculations on the probability of certain effects without the proof that such effects have resulted from the same causes.

Section VII.

INQUIRIES AND SYSTEMATIC INSPECTION.

2. HE SHALL ENQUIRE INTO AND ASCERTAIN BY SUCH MEANS AS ARE AT HIS DISPOSAL THE CAUSES, ORIGIN, AND DISTRIBUTION OF DISEASES WITHIN HIS DISTRICT, AND ASCERTAIN TO WHAT EXTENT THE SAME HAVE DEPENDED ON CONDITIONS CAPABLE OF REMOVAL OR MITIGATION.

3. HE SHALL BY INSPECTION OF THE DISTRICT, BOTH SYSTEMATICALLY AT CERTAIN PERIODS AND AT INTERVALS

AS OCCASION MAY REQUIRE, KEEP HIMSELF INFORMED OF THE CONDITIONS INJURIOUS TO HEALTH EXISTING THEREIN.

There is little in this which is not included in the first clause, or which does not naturally flow from it, but it is intended that the medical officer of health shall enquire not only into the prevalence of disease generally, but into the particular diseases which may have arisen from conditions affecting the public health.

The first duty will be to ascertain the particular disease and the number of cases which have occurred in the district as a whole, and in the several parts of it, with a view to determine inferentially that there are conditions injurious to health operating in particular parts which do not, at least to the same degree, affect the whole. It will be necessary to proceed with caution, for in proportion as the area is lessened so will be the difficulty of obtaining fair average returns. In like manner the shortness of the period of enquiry may lead to results which will not be applicable to a longer period, and in particular the effect of season of the year, and the special characteristics of particular years, will complicate the problem.

Let us assume that the kind of disease and the number of persons afflicted with it may by proper enquiry be ascertained, still the essence of the direction is the connection which may exist between them and certain supposed causes of disease on the same area. The former may be based upon facts and produce conviction, whilst the latter is very likely to be speculative, and, being based more upon opinion than facts, may not carry conviction. Hence it is most desirable that the former should be obtained with scrupulous accuracy, and the latter with great caution. The mode in

which this connection is investigated will either largely increase our knowledge of the causation of disease or it will flood sanitary literature with speculations and assertions which may bewilder enquirers and retard the advance of the science.

It is not desirable to attempt too much minuteness in determining the influence of localities of very small area, but if the district be an extensive one, and comprehend populations diversely employed, or placed under sanitary conditions which are clearly different, it may be less difficult to connect the disease with its cause, and the demonstration may be more convincing. The chief direction of the enquiry will doubtless be the causes of infectious and contagious disease, not only because of the superior importance of that class of diseases, but of the knowledge which already exists as to their cause. In reference to the latter it may be desirable to guard the medical officer of health from assuming that our knowledge upon that point is necessarily correct, and to urge him to consider the facts for himself and to draw his own inferences. Should this be done judiciously by all the medical officers of health under the variety of conditions which will present themselves, we may look forward to the result with great satisfaction.

It is further desirable to consider under this head whether there are sufficient grounds for the assertion that contagious and infectious diseases ought not to exist. This implies that the nature of such diseases is well known, and that their dependence upon known and defined sanitary conditions has been proved.

It will be very evident that, before the medical officer of health can ascertain to what extent diseases may have de-

pended on conditions capable of removal or mitigation, he must have been able clearly to connect the disease with a particular condition, and have overcome the difficulty just pointed out, but, having determined the fact to his satisfaction, it will be necessary for him to personally inspect the supposed cause, and determine how far it may be removed or mitigated. The results of this may not be any action to be immediately taken by himself, but it should appear in his diary or reports to be subsequently referred to, and may lead to a modification of the by-laws if of a general character, or to some specific action if it apply to a house or to a special locality.

It will be observed that the direction is not limited to mortal diseases, but to all diseases, and as he cannot know of his own knowledge every case of sickness and its nature, it is clear that, if this is to have its due force, he must be able to obtain such information by other means. No other appear available or efficient but the medical practitioners of the district—the whole of them, and not merely the Poor Law medical officers; but no provision is made in the Acts by which this can be universally obtained, and if any material omissions occur, the results will be valueless for the purpose in question. Hence there is too much reason to fear that without further legislation this clause will be of little practical value. If the diseases were limited to those which are mortal, or of a contagious or epidemic character, the information might be more readily obtained, but the scope of the enquiry is much beyond that, by embracing all diseases, and has an important bearing on national wealth.

By Clause 3 it is expected that not only will the medical officer of health carry out the directions of Clause 1, on

entering upon his duties, but that he will keep up and correct his knowledge of the several localities as changes are effected therein. This, it might be presumed, he would necessarily do in the discharge of his duties as medical officer of health, but proof of this is required by fixing a definite or stated time for visits which will appear in his diary and reports, and be known in each locality. This regulation will be very useful, since there is a tendency in official work to become irregular and desultory rather than fixed and defined. It will also remove any ground for excuse of want of knowledge, for it will presume that the requisite knowledge should have been obtained at least at the fixed periods of inspection.

It also provides that the knowledge shall be gained by personal inspection, and not by indirect means, which again increases the responsibility of the officer. This implies that the medical officer of health shall visit every village and hamlet in his district, and perambulate it, noticing the sanitary state of the roads, drains, houses, water supply, and all other influences which affect or threaten to affect injuriously the public health within his district. If this duty be discharged with intelligence and thoroughness, the officer will not be in the hands of his inspector of nuisances or any other person, but will have personal knowledge, and be enabled to act with more satisfaction to himself, and, probably, with more justice to others. If, however, it be done cursorily, as by simply riding or driving through the hamlet and making an enquiry here and there, or observing only such matters as are very prominent or are specially pointed out to him, the spirit and essence of the clause will not be observed. At the same time a zealous officer should

make his inspection with caution and discretion, so that he may not unduly excite hostility or lose himself in a number of small and comparatively unimportant particulars, and it will probably avert much annoyance and conduce to the successful working of the Act if he make as few oral observations as possible at the time and avoid personal discussions. His inspection should be rather for his own information, and to make a proper record for subsequent action than to attempt to remedy evils on the spur of the moment.

This important duty necessarily involves the expenditure of time and money, and demands proportionate leisure and salary. It also involves the question of the extent of his district, for if it be very large, his personal knowledge acquired by such visits will probably be soon forgotten, and thereby the chief object of the regulation will fail. There certainly is a limit to the extent of the district within which the officer will be the most useful. It is probable that the systematic visitation should not be less frequent than quarterly in the country, and perhaps somewhat more frequent in towns, but the period has been left to the discretion of the officer and the sanitary authority.

CHAPTER II.

PERSONAL ACTION UNDER THE DISEASES' PREVENTION ACT, 1855, AND DURING AN ATTACK OF EPIDEMIC DISEASE.

6. ON RECEIVING INFORMATION OF THE OUTBREAK OF ANY CONTAGIOUS, INFECTIOUS, OR EPIDEMIC DISEASE OF A DANGEROUS CHARACTER WITHIN THE DISTRICT, HE SHALL VISIT THE SPOT WITHOUT DELAY, AND ENQUIRE INTO THE CAUSES AND CIRCUMSTANCES OF SUCH OUTBREAK, AND ADVISE THE PERSONS COMPETENT TO ACT AS TO THE MEASURES WHICH MAY APPEAR TO HIM TO BE REQUIRED TO PREVENT THE EXTENSION OF THE DISEASE, AND, SO FAR AS HE MAY BE LAWFULLY AUTHORISED, ASSIST IN THE EXECUTION OF THE SAME.

17. WHENEVER THE DISEASES' PREVENTION ACT OF 1855 IS IN FORCE WITHIN THE DISTRICT, HE SHALL OBSERVE THE DIRECTIONS AND REGULATIONS ISSUED UNDER THAT ACT BY THE LOCAL GOVERNMENT BOARD, SO FAR AS THE SAME RELATE TO OR CONCERN HIS OFFICE.

THE action under Clause 6 is consequent upon receiving information, but it is to be noted that it is not limited to official information from the inspector of nuisances, but from any source whatever, including his own knowledge and even public rumour, and he would not be justified in waiting for any official instructions or official information. This direction should be liberally construed and held to mean that he

should adopt measures at the earliest possible moment to prevent the extension of the disease. The efficacy of such action will often depend upon the promptness with which it is undertaken, and a delay of even a few hours may prevent the possibility of the safe removal of a case of small-pox to an hospital, or allow communication between healthy with infected persons.

The causes and circumstances to be enquired into will vary with the nature of the disease, but are included in the following :—

1. Approach to or Contact with Infected Persons or Things.
2. Impure Water.
3. Decomposing Animal and Vegetable Substances and Filthy Houses.
4. Sewage Emanations.
5. Impure Air.
6. Meteorological and Seasonal Influences.

The first refers chiefly to such diseases as small-pox and scarlet-fever ; the second, third, and fourth, to typhoid fever ; the fifth, to typhus-fever ; the sixth, to influenza ; whilst cholera is associated with the second, and probably with the fifth and sixth.

Section I.

APPROACH TO OR CONTACT WITH INFECTED PERSONS OR THINGS.*

The Sanitary Act of 1866 contains many useful provisions in reference to infected persons and things.

* See also page 198.

The Sanitary Act, 1866.
(29 & 30 Vict. c. 90.)

As to the Disinfection of Houses, &c.

Section 22.—If the nuisance authority shall be of opinion upon the certificate of any *legally qualified medical practitioner* that the cleansing and disinfecting of any house or part thereof, and of any article therein likely to retain infection, would tend to prevent or check infectious or contagious disease, it shall be the duty of the nuisance authority to give notice in writing requiring the owner or occupier of such house or part thereof to cleanse and disinfect the same, as the case may require;

And if the person to whom notice is so given fail to comply therewith within the time specified in the notice, he shall be liable to a penalty of not less than one shilling, and not exceeding ten shillings, for every day during which he continues to make default;

And the nuisance authority shall cause such house or part thereof to be cleansed and disinfected, and may recover the expenses incurred from the owner or occupier in default in a summary manner.

When the owner or occupier of any such house or part thereof as is referred to in this section is from poverty or otherwise unable in the opinion of the nuisance authority effectually to carry out the requirement of this section, such authority may, without enforcing such requirements on such owner or occupier, with his consent, at his own expense, cleanse and disinfect such house or part thereof, and any articles therein likely to retain infection.

As to Use of Public Conveyances by Infected Persons.

Section 25.—If any person suffering from any dangerous infectious disorder shall enter any public conveyance without previously notifying to the owner or driver thereof that he is so suffering, he shall, on conviction thereof before any justice, be liable to a penalty not exceeding five pounds, and shall also be ordered by such justice to pay to such owner

and driver all the losses and expenses they may suffer in carrying into effect the provisions of this Act;

And no owner or driver of any public conveyance shall be required to convey any person so suffering until they shall have been first paid a sum sufficient to cover all such losses and expenses.

As to Removal of Infected Persons to Hospitals, and Destruction of Infected Clothing.

Section 26.—Where a hospital or place for the reception of the sick is provided within the district of a nuisance authority, any justice may, with the consent of the superintending body of such hospital or place, by order on a certificate signed by *a legally qualified medical practitioner*, direct the removal to such hospital or place for the reception of the sick, at the cost of the nuisance authority, of any person suffering from any dangerous, contagious, or infectious disorder being without proper lodging or accommodation, or lodged in a room occupied by more than one family, or being on board any ship or vessel.

As to the Burial of Infected Persons.

Section 27.—Any nuisance authority may provide a proper place for the reception of dead bodies, and where any such place has been provided, and any dead body of one who has died of any infectious disease is retained in a room in which persons live or sleep, or any dead body which is in such a state as to endanger the health of the inmates of the same house or room, is retained in such house or room, any justice may, on a certificate signed by a *legally qualified medical practitioner*, order the body to be removed to such proper place of reception at the cost of the nuisance authority, and direct the same to be buried within a time to be limited in such order:

And unless the friends or relatives of the deceased undertake to bury the body within the time so limited, and do bury the same, it shall be the duty of the relieving officer to bury such body at the expense of the poor rate, but any expense so incurred may be recovered by the relieving

officer in a summary manner from any person legally liable to pay the expense of such burial.

As to a Post-mortem House.

Section 28.—Any nuisance authority may provide a proper place (otherwise than at a workhouse or at a mortuary house, as lastly hereinbefore provided for) for the reception of dead bodies for and during the time required to conduct any *post-mortem* examination ordered by the coroner of the district or other constituted authority, and may make such regulations as they may deem fit for the maintenance, support, and management of such place.

As to Wilful Exposure of Infected Persons.

Section 38.—Any person suffering from any dangerous infectious disorder who wilfully exposes himself without proper precautions against spreading the said disorder, in any street, public place, or public conveyance, and any person in charge of one so suffering who so exposes the sufferer, and any owner or driver of a public conveyance who does not immediately provide for the disinfection of his conveyance after it has with the knowledge of such owner or driver conveyed any such sufferer, and any person who without previous disinfection gives, lends, sells, transmits, or exposes any bedding, clothing, rags, or other things which have been exposed to infection from such disorders, shall, on conviction of such offence before any justice, be liable to a penalty not exceeding five pounds.

Provided that no proceedings under this section shall be taken against persons transmitting with proper precautions any such bedding, clothing, rags, or other things for the purpose of having the same disinfected.

As to Letting Infected Rooms or Houses.

Section 39.—If any person knowingly lets any house, room, or part of a house in which any person suffering from any dangerous infectious disorder has been, to any other person, without having such house, room, or part of a house, and all articles therein liable to retain infection, disinfected to the

satisfaction of a *qualified medical practitioner* as testified by a certificate given by him, such person shall be liable to a penalty not exceeding twenty pounds.

For the purposes of this section the keeper of an inn shall be deemed to let part of a house to any person admitted as a guest into such inn.

Common Lodging-houses Act, 1851.

(14 & 15 Vict. c. 28.)

As to Infection in Common Lodging-houses.

Section 11.—The keeper of a common lodging-house shall, when a person in such house is ill of fever or any infectious or contagious disease, give immediate notice thereof to the local authority, or some officer of the local authority.

Section 14.—If the keeper of a common lodging-house, or any other person having or acting in the care or management thereof, offend against any of the provisions of this Act, or any of the by-laws or regulations made in pursuance of this Act, or if any person in any common lodging-house be confined to his bed for forty-eight hours by fever or any infectious or contagious disease without the keeper of such house giving notice thereof as required by this Act, every person so offending shall for every such offence be liable to a penalty not exceeding five pounds, and to a further penalty not exceeding forty shillings for every day during which the offence continues.

The Sanitary Act, 1866.

(29 & 30 Vict. c. 90.)

As to Providing a Disinfecting Apparatus.

Section 23.—The nuisance authority in each district may provide a proper place with all necessary apparatus and attendance for the disinfection of woollen artticles, clothing, or bedding which have become infected, and they may cause any articles brought for disinfection to be disinfected free of charge.

As to Providing a Carriage for Conveyance of Infected Persons.

Section 24.—It shall be lawful at all times for the nuisance authority to provide and maintain a carriage or carriages suitable for the conveyance of persons suffering under any contagious or infectious disease, and to pay the expense of conveying any person therein to a hospital or place for the reception of the sick, or to his own home.

A very similar clause exists in the Nuisances' Removal and Diseases' Prevention Act, 1860, and is as follows:—

NUISANCES' REMOVAL AND DISEASES' PREVENTION ACT, 1860.

(23 & 24 Vict. c. 77.)

Section 12.—It shall be lawful for the local authority for executing the said Diseases' Prevention Act to provide and maintain a carriage or carriages suitable for the conveyance of persons suffering under any contagious or infectious disease, and to convey such sick and diseased persons as may be residing within such locality, to any hospital or other place of destination, and the expense thereof shall be deemed to be an expense incurred in executing the said Act.

THE SANITARY ACT, 1866.

(29 & 30 Vict. c. 90.)

As to Erection of Hospitals for Infected Persons.

Section 37.—The sewer authority or, in the metropolis, the nuisance authority may provide for the use of the inhabitants within its district hospitals or temporary places for the reception of the sick.

Such authority may itself build such hospitals or places of reception, or make contracts for the use of any existing hospital or part of a hospital, or for the temporary use of any place for the reception of the sick.

It may enter into any agreement with any person or body

of persons having the management of any hospital for the reception of the sick inhabitants of its district, on payment by the sewer authority of such annual or other sum as may be agreed upon.

The carrying into effect this section shall, in the case of a sewer authority, be deemed to be one of the purposes of the said Sewage Utilisation Act, 1865, and all the provisions of the said Act shall apply accordingly.

Two or more authorities having respectively the power to provide separate hospitals may combine in providing a common hospital, and all expenses incurred by such authorities in providing such hospital shall be deemed to be expenses incurred by them respectively in carrying into effect the purposes of this Act.

As to Infection in Boats or Ships.

Section 29.—Any nuisance authority may, with the sanction of the Privy Council, signified in manner provided by the Public Health Act, 1858, lay down rules for the removal to any hospital to which such authority is entitled to remove patients, and for keeping in such hospital so long as may be necessary, any persons brought within their district by any ship or boat who are infected with a dangerous and infectious disorder, and they may by such rules impose any penalty not exceeding five pounds on any person committing any offence against the same.

Section 30.—For the purposes of this Act any ship, vessel, or boat that is in a place not within the district of a nuisance authority shall be deemed to be within the district of such nuisance authority as may be prescribed by the Privy Council, and until a nuisance authority has been prescribed, then of the nuisance authority whose district nearest adjoins the place where such ship, vessel, or boat, is lying, the distance being measured in a straight line, but nothing in this Act contained shall enable any nuisance authority to interfere with any ship, vessel, or boat that is not in British waters.

Section 31.—The power of entry given to the authorities by the 11th section of the Nuisances' Removal Act, 1855, may be exercised at any hour when the business in respect

of which the nuisance arises is in progress, or is usually carried on.

And any justice's order once issued under the said section shall continue in force until the nuisance has been abated, or the work for which the entry was necessary has been done.

Section 32.—Any ship or vessel lying in any river, harbour, or other water, shall be subject to the jurisdiction of the nuisance authority of the district within which such river, harbour, or other water, is and be within the provisions of the Nuisances' Removal Acts in the same manner as if it were a house within such jurisdiction, and the master or other officer in charge of such ship shall be deemed for the purposes of the Nuisances, Removal Acts to be the occupier of such ship or vessel.

But this section shall not apply to any ship or vessel belonging to Her Majesty or to any foreign government.

Section 52.—Every vessel having on board any person affected with a dangerous or infectious disorder shall be deemed to be within the provisions of the Act of the 6th year of King George IV., chapter 78, although such vessel has not commenced her voyage, or has come from or is bound for some place in the United Kingdom.

ORDERS OF THE PRIVY COUNCIL.

The following are the Orders of the Privy Council now in force under the Sanitary or Quarantine Acts :—

As to Cholera.

Order dated the 3rd day of August, 1871.

1. It shall be lawful for any Custom-house officer or other person having authority from the Commissioners or Board of Customs, at any time, before the nuisance authority or the local authority, as the case may be, to visit and examine such ship as in the clause of the said recited Orders numbered 2 is mentioned, to detain any ship arriving at any port of the United Kingdom in which there is or may have been during the voyage any case of cholera, and the master of such ship shall forthwith moor, anchor, or place the said

ship in such position as such Custom-house officer or other person as aforesaid shall order.

2. No person shall after any such detention, and whilst such ship shall be so detained, land from any such ship.

3. Any Custom-house officer, or other person, detaining any ship as aforesaid, shall forthwith give notice thereof, and of the cause of such detention, to the proper nuisance authority, or local authority, as the case may be.

4. Such detention shall cease as soon as the nuisance authority, or the local authority, as the case may be, shall visit and examine the said ship as in the clause numbered 2 of the said recited orders is mentioned, or at the expiration of twelve hours after notice shall have been given to such nuisance authority or local authority as aforesaid.

5. In this Order—

The terms "ship," "master," "cholera," "nuisance authority," "local authority," shall include and have the meaning assigned to them respectively, in the said Orders of the 29th day of July, and 3rd of this instant August.

6. Every person obstructing any Custom-house officer or other person as aforesaid in carrying this Order into effect or otherwise offending against this Order, shall be liable, on summary conviction, to a penalty not exceeding twenty pounds.

7. And the Lords Commissioners of Her Majesty's Treasury are to give the necessary directions herein accordingly.

Order dated the 29th day of July, 1871.

1. In this Order—

The term "ship" includes vessel or boat:

The term "master" includes the officer or person for the time being in charge or command of a ship:

The term "cholera" includes choleraic diarrhœa:

The term "nuisance authority" has the same meaning as in the Sanitary Act, 1866.

2. It shall be lawful for any nuisance authority having reason to believe that any ship arriving in its district comes from a place infected with cholera, to visit and examine such ship before it enters any port, or lands any person or

thing in the district, for the purpose of ascertaining whether such ship comes within the operation of this Order.

3. The master of every ship within the district of a nuisance authority having on board any person affected with cholera, or the body of any person dead of cholera, or anything infected with or that has been exposed to the infection of cholera, shall, as long as the ship is within such district, moor, anchor, or place her in such position as from time to time the nuisance authority directs.

4. No person shall land from any such ship until the examination hereinafter mentioned has been made.

5. The nuisance authority shall, immediately on the arrival of such a ship, cause all persons on board of the same to be examined by a legally qualified medical practitioner, and shall permit all persons who shall not be certified by him to be suffering from cholera to land immediately.

6. All persons certified by the examiner to be suffering from cholera shall be dealt with under any rules that may have been made by the nuisance authority under the 29th section of the Sanitary Act, 1866, or where no such rules shall have been made, shall be removed, if their condition admits of it, to some hospital, or place to be designated for such purpose by the nuisance authority; and no person so removed shall quit such hospital or place until some physician or surgeon shall have certified that such person is free from the said disease.

7. In the event of any death from cholera taking place on board of such vessel, the body shall be taken out to sea, and committed to the deep, properly loaded, to prevent its rising.

8. The clothing and bedding of all persons who shall have died, or had an attack, of cholera, on board such vessel, shall be disinfected, or (if necessary) destroyed, under the direction of the nuisance authority.

9. The ship, and any articles therein which may be infected with cholera, shall be disinfected by the nuisance authority.

10. Every person obstructing the nuisance authority in carrying this Order into effect, or otherwise offending against this Order, shall be liable, on summary conviction, to a penalty not exceeding twenty pounds.

Order dated the 5th day of August, 1871.

1. No master of any ship in which, during the voyage and before the arrival thereof at any port of the United Kingdom, any person has been attacked with or died of cholera shall bring his ship into any such port until he has destroyed the clothing and bedding of all persons who shall so have died or had an attack of cholera on board such vessel during such voyage.

2. In this Order—

The term "ship" includes vessel or boat:

The term "master" includes the officer or person for the time being in charge or command of a ship:

The term "cholera" includes choleraic diarrhœa.

3. The terms "clothing and bedding" mean and include all clothing and bedding in actual use and worn or used by the person attacked as aforesaid at the time of and during such attack.

4. Every person offending against this Order shall be liable, on summary conviction, to a penalty not exceeding twenty pounds.

5. The Lords Commissioners of Her Majesty's Treasury are to give the necessary directions herein accordingly.

The importance of these enactments cannot be overstated, for there can be no doubt that infection and contagion are spread by actual contact with infected persons, and that a most effectual mode of preventing further extension of the disease is to prevent further possibility of contact. This contact may be of the skin, as in scarlet-fever, where the exuviæ pass from the infected persons; or through the atmosphere, as in typhus-fever and exanthematous diseases, where it is connected with emanations from the lungs, skin, and excreta; or with the excreta themselves, as in cholera.

It may, however, be through the intervention of linen which has been in contact with the infected person, or saturated with his excretions or through other substances or

articles which he has touched, as table utensils, books, letters, materials used in process of trade, carriages, and articles of domestic furniture. It is probable that contact with the body and linen are the most frequent modes of infection, but diligent enquiry should be made as to any other. The extent to which infection may pass through the atmosphere and retain its infectious quality has not been determined, but it is clear that dilution lessens the probability of infection, whilst concentration increases it. Such a problem is thus essentially connected with that of renewal of the air, and the rapidity of the removal of the infected air, but in a moderately ventilated room it may be doubted whether infection in a degree dangerous to health can take place at a distance greater than perhaps six feet from the infected person or article, especially if the infected person be kept to leeward, or not in the line of the air-current from him.

Section II.

IMPURE WATER.

The Legislature has made abundant provision for the supply of good water, but has not made it compulsory on the local authority.

WATER SUPPLY.

PUBLIC HEALTH ACT, 1848.
(11 & 12 Vict. c. 63.)

Section 75.—And be it enacted that the local board may provide their district with such a supply of water as may be proper and sufficient for the purposes of this Act, and for private use to the extent required by this Act; . . . . .

And any waterworks company may contract with the local board of health to supply water for the purposes of this Act in any manner whatsoever, or may sell and dispose of or lease their waterworks to any local board of health wishing to take the same;

And the said local board may provide and keep in repair any waterworks constructed or laid down by them under the powers of this Act for a supply of pure and wholesome water, and the water so supplied may be constantly laid on at such pressure as will carry the same to the top story of the highest dwelling-house within the district supplied.

Section 76.—And be it enacted that if, upon the report of the surveyor, it appear to the local board of health that any house is without a proper supply of water, and that such supply of water can be furnished thereto at a rate not exceeding twopence per week, the said local board shall give notice in writing to the occupier requiring him within a time to be specified therein to obtain such supply, and to do all such works as may be necessary for that purpose.

And if such notice be not complied with, the said local board may, if they shall think fit, do such works and obtain such supply accordingly, and make and levy water-rates upon the premises, not exceeding in the whole the rate of twopence per week, in manner hereinafter provided, as if the owner or occupier of the premises had demanded a supply of water and were willing to pay rates for the same.

And the expenses incurred by them in so doing such works as last aforesaid shall be private improvement expenses, and be receivable as such in the manner hereinafter provided.

Common Lodging-houses Act, 1853.
(16 & 17 Vict. c. 41.)

Section 6.—Where it appears to the local authority that a common lodging-house is without a proper supply of water for the use of the lodgers, and that such a supply can be furnished thereto at a reasonable rate, the local authority may, by notice in writing, require the owner or keeper of the common lodging-house within a specified time to obtain such supply, and to do all works necessary thereto.

And if the notice be not complied with accordingly, the local authorities may remove the common lodging-house from the register until it be complied with.

Public Health Act, 1848.
(11 & 12 Vict. c. 63.)

Section 78.—And be it enacted that the local board of health may cause all existing public cisterns, pumps, wells, reservoirs, conduits, aqueducts, and works used for the gratuitous supply of water to the inhabitants, to be constructed, maintained, and plentifully supplied with water, or they may substitute, continue, maintain, and plentifully supply with water any other such works equally convenient.

The Metropolis' Water Act, 1871.
(34 & 35 Vict. c. 113.)

CONSTANT SUPPLY.

Companies to provide Constant Supply of Water.

Section 7.—Subject to the provisions of this Act, every company may, and from and after the expiration of eight months from the passing of this Act every company shall, when required so to do, in the manner directed by this Act, provide and keep throughout their water limits, or throughout such parts of such limits as they may be required in manner aforesaid, a constant supply of pure and wholesome water sufficient for the domestic purposes of the inhabitants within such water limits constantly laid on at such pressure as will make such water reach the top story of the highest houses within such water limits (but not exceeding the level prescribed by the special Act) of such company (which supply is in this Act referred to as a "constant supply"); and every such company shall, subject to the provisions of the special Act as the same are amended by this Act, give and continue to give to such inhabitants a constant supply for domestic purposes in manner prescribed.

Application for Constant Supply.

Section 8.—At any time after the expiration of six months

from the passing of this Act, the metropolitan authority shall, whenever they are of opinion that there should be in any district a constant supply, make application to the company within the water limits in which such district is situate, requiring a constant supply in such district, and any company may without any such application propose to the metropolitan authority to give a constant supply in any district.

Appeal to Board of Trade.

Section 9.—When application has been made to any company requiring such company to provide a constant supply, or when any company has given notice to a metropolitan authority of a proposal to give a constant supply in any district, and the company so required, or the metropolitan authority upon whom notice of such proposal has been served, object to such requisition or proposal, it shall be lawful for such company or metropolitan authority, within one month after the making of such application or service of such notice, to present a memorial to the Board of Trade, setting forth their objections to such requisition or proposal, and the party presenting such memorial, or such company, shall give notice to the other party of the presentation of such memorial, and shall transmit to such party a copy of the same. The Board of Trade shall, as soon as conveniently may be after the receipt of such memorial, take the same into their consideration, and may, if they think fit, institute any enquiry in relation thereto, and may hear such company and authority desiring to be heard, and may make such order in reference thereto, and as to the costs thereof and incident to the same, as to them shall seem just.

Restriction as to Compulsory Supply by Companies.

Section 10.—No company shall be compelled to give a constant supply to any premises in any district until the regulations provided for by this Act are made and are in operation within such district, or if it can be shown by such company that at any time after the expiration of two months from the time of the service of any requisition for constant supply more than one-fifth of the premises in such district are

not provided with the prescribed fittings, without prejudice nevertheless to any renewed requisition at a future period.

In any district in which any default in respect of the prescribed fittings shall be found, the metropolitan authority may by notice in writing require the owner or occupier of any such premises, within a time to be specified in such notice, to provide the prescribed fittings, or to cause the fittings in such premises to be repaired, so as to prevent any waste of water, and if any person fail to comply with the terms of such notice, the metropolitan authority may provide for such premises the prescribed fittings, or repair the fittings within the same, as the case may be.

The expenses incurred by the metropolitan authority in providing such fittings or in making such repairs shall be paid to them by the person liable to pay the rate for the water supplied, or on whose credit the water is supplied, or by the owner of the premises.

All such expenses may be recovered, with costs, from the owner, and to the extent of any rent due by the occupier of the premises, from such occupier, by proceedings in a court of summary jurisdiction, or by action in any court having jurisdiction locally in the matter, as if the same were an ordinary simple contract debt; and any sum and costs so recovered from an occupier may be deducted by him from the rent payable by him to the owner, and shall be allowed by the owner and every other person interested in the rent, as if the same had been actually paid as rent; but if in any case an occupier fails to disclose the amount of rent due by him, or the name or address of the owner, he shall be liable to pay the full amount of such expenses and costs: Provided further that as between any such owner and occupier nothing herein contained shall be taken to affect any contract made between them respecting the payment of the expenses of any such works as aforesaid.

Power of Board of Trade to require Constant Supply, in certain cases.

Section 11.—It shall be lawful for the Board of Trade, at any time after the expiration of six months from the passing

of this Act, to require a constant supply to be provided in any district by the company within the water limits of which such district is situate, upon complaint made, and in case it appears to such Board, after due enquiry—

That the metropolitan authority refuses to make or unreasonably delays making application for such constant supply; or

That, by reason of the insufficiency of the existing supply of water in such district, or the unwholesomeness of such water in consequence of its being improperly stored, the health of the inhabitants of such district is or is likely to be prejudicially affected.

Notice requiring or proposing Constant Supply to be served upon Company or Metropolitan Authority.

Section 12.—Where a constant supply is required in any district, notice to that effect shall be served, on behalf of the party requiring the same, upon the company required to provide such supply; and where a constant supply is proposed to be given in any district by any company, notice to that effect shall be served on behalf of such company upon the metropolitan authority. In every such notice shall be stated accurately the district in which such constant supply is required or proposed to be given, and the day (not being an earlier day than four months after the date of the service of such notice) upon and from which such supply is to commence.

Extension of Time to Companies.

Section 13.—Where a constant supply is required in any district, and the company is unable, from want of funds or other cause of any kind, to execute all the necessary works within the time prescribed by this Act, the Board of Trade, if they think fit, may extend the time for the giving of such supply generally, or may extend the time, and direct such supply to be given at different times in succession, to the several parts of such district, in such manner as may be found most convenient: Provided that application be made

by the company for such extension of time within one month after the notice referred to in the last preceding section has been served upon them.

Provision for Supply in Courts, Passages, &c.

Section 14.—With respect to cases where a group or number of dwelling-houses are situate in a court or passage, or otherwise in contiguity with or in close neighbourhood to one another, the following further provisions shall have effect; that is to say:—

(1) If at any time it appears to the Board of Trade, on the report of the nuisance authority, as defined by the Sanitary Act, 1866, that a constant supply cannot be well and effectually provided for that group or number of dwelling-houses, except by means of a stand-pipe or other apparatus placed outside the dwelling-houses, the Board of Trade may from time to time make an order to the effect that such group or number of dwelling-houses may be so supplied, and shall serve the same on the company within whose water limits the dwelling-houses are situate:

(2) If the requisite stand-pipe or other apparatus in accordance with the regulations of the company is provided, then the company shall give to those dwelling-houses a supply accordingly by means of the stand-pipe or other apparatus so provided, and on giving such supply shall be entitled to receive and recover water-rates or rents from the owners or occupiers of such dwelling-houses as if the supply had been given in the premises. The expense of providing such stand-pipe or other apparatus shall be borne by the owner of the dwelling-houses, or if there is more than one owner, then by the respective owners in such proportions as the Board of Trade shall direct:

(3) The Board of Trade may at any time abrogate, wholly or in part, the order, or may originally grant it only for a limited period.

Provision for case of Frost, &c.

Section 15.—Notwithstanding anything in this Act, a company shall not be subject to any liability for not giving a constant supply if the want of such supply arises from frost, unusual drought, or other unavoidable cause or accident.

Penalties for Non-compliance with Preceding Provisions.

Section 16.—Any company which violates, refuses, or neglects to comply with any of the preceding provisions of this Act shall be liable to a penalty not exceeding two hundred pounds, and to a further penalty not exceeding one hundred pounds for every month during which such violation or refusal or neglect to comply with the said provisions continues after they shall have received notice in writing from the Board of Trade to discontinue such violation, refusal, or neglect as aforesaid.

Publication of Regulations.

Section 23.—A printed copy of all regulations in force for the time being shall be kept at the office of the metropolitan authority and of every company within the limits of this Act, and all persons may at all reasonable times inspect such copy without payment, and each company shall cause to be delivered a printed copy, authenticated by their seal, of all regulations for the time being in force to every person applying for the same, on payment of any sum not exceeding one shilling and sixpence for every such copy, and a printed copy of the regulations for the time being in force relative to any particular district only to every person applying for the same, on payment of any sum not exceeding threepence for every such copy.

SUPPLY OF PRESCRIBED FITTINGS.

Notice relating to Constant Supply to be published in 'London Gazette,' &c.

Section 26.—When notice in relation to a constant supply

in any district has been served upon or by any company, the party by whom or on whose behalf such notice shall be served shall, within five days after the service thereof, cause to be published a copy of the same once in the *London Gazette*, and copies of the same once at least in each of two successive weeks in any two daily newspapers circulated within the limits of this Act.

Company may issue Notice upon Owners and Occupiers to provide prescribed Fittings.

Section 27.—Where in any district any company is required or has proposed to provide a constant supply, such company may, at any time after the expiration of one month after the publication in the *London Gazette* of a copy of the notice requiring or proposing such constant supply, unless a memorial or application has been presented or made to the Board of Trade objecting to such constant supply or seeking an extension of time, and if any such memorial or application has been presented or made, then at such time after the determination of the Board of Trade in relation to such memorial or application as such Board shall approve and order, cause to be served on the owner or occupier of any premises within such district a notice requiring such owner or occupier to supply such premises with the prescribed fittings.

Owner or Occupier to provide prescribed Fittings.

Section 28.—Every owner or occupier of premises upon whom notice to that effect has been served shall, within two months after the date of the service of such notice, provide the prescribed fittings, and shall from time to time keep the same in proper repair.

In case of Default by Owner or Occupier, Company may provide or repair prescribed Fittings.

Section 29.—Where in any district any company is required or has proposed to provide a constant supply; and

Any owner or occupier of premises upon whom notice to provide prescribed fittings has been served by such company makes default in providing the prescribed fittings, such company, if they think fit, may provide such fittings; or

Where in any such district the fittings of any person are out of order, and not as prescribed, such company may by notice in writing require such person, within twenty-four hours after the date of the service of such notice, to cause the same to be repaired, so as to prevent any waste of water; and if any person fail to comply with the terms of such notice, such company (if they think fit) may repair the fittings of such person.

The expenses incurred by such company in providing such fittings or in making such repairs shall be paid to them by the person liable to pay the rate for the water supplied, or on whose credit the water is supplied by means of such fittings, or by the owner of the premises.

All such expenses may be recovered, with costs, from the owner, and to the extent of any rent due by the occupier of the premises from such occupier, by proceedings in a court of summary jurisdiction, or by action in any court having jurisdiction locally in the matter, as if the same were an ordinary simple contract debt; and any sum and costs so recovered from an occupier may be deducted by him from the rent payable by him to the owner, and shall be allowed by the owner and every other person interested in the rent, as if the same had been actually paid as rent; but if in any case an occupier fails to disclose the amount of rent due by him, or the name or address of the owner, he shall be liable to pay the whole amount of such expenses and costs: Provided that as between any such owner and occupier nothing herein contained shall be taken to affect any contract made between them respecting the payment of the expenses of any such works as aforesaid.

Power to enter Premises for Inspection and Repair of Fittings.

Section 30.—Where in any district any company is required or has proposed to provide a constant supply, the officers or agents of such company, or of the party requiring such supply, or any person appointed for such purpose by the

Board of Trade, may, at all reasonable times, enter any premises within such district, in order to inspect the premises for the purposes of this Act, and examine the same with a view to ascertain whether there are in or about the same the prescribed fittings, or, where authorised under the provisions of this Act, to provide or repair the fittings; and if any person hinder any such officer, agent, or person from entering and making such inspection or examination, or providing or repairing such fittings, every person so offending shall for every such offence be liable to a penalty not exceeding five pounds.

Settlement of Disputes as to Sufficiency, &c. of Fittings.

Section 31.—In the event of any dispute as to whether the fittings of any person are as prescribed, such dispute shall be settled by the court of summary jurisdiction, on the application of either party, which court may make such order as to the amount of the costs of the proceedings before such court as seems just, and the decision of such court shall be final and binding on all parties.

Penalties for Non-compliance with the Provisions of Act.

Section 32.—Where in any district any company is required or has proposed to provide a constant supply—

If any person supplied with water by such company wilfully or negligently causes or suffers any fittings to be out of repair, or to be so used or contrived as that the water supplied to him by such company is or is likely to be wasted, misused, unduly consumed, or contaminated, or so as to occasion or allow the return of foul air or other noisome or impure matter into any pipe belonging to or connected with the pipes of such company, he shall for every such offence be liable to a penalty not exceeding five pounds; or

If any person supplied with water by such company wrongfully does or causes or permits to be done anything in contravention of any of the provisions of the special Act or this Act, or wrongfully fails to do anything which, under any of those provisions, ought to be done for the prevention of the

waste, misuse, undue consumption, or contamination of the water of such company, they may (without prejudice to any remedy against him in respect thereof) cut off any of the pipes by or through which water is supplied by them to him or for his use, and may cease to supply him with water, so long as the cause of injury remains or is not remedied; and in every case of so cutting off or ceasing to supply, the company shall within twenty-four hours thereafter give to the nuisance authority, as defined by the Sanitary Act, 1866, notice thereof.

CONTAMINATED WATER.

Precautions have also been taken with a view to prevent contamination of the water supply.

Public Health Act, 1848.
(11 & 12 Vict. c. 63.)

Section 80.—And be it enacted that whosoever shall bathe in any stream, reservoir, conduit, aqueduct, or other waterworks belonging to or under the management or control of the local board of health, or in any reservoir, conduit, aqueduct, or other waterworks constructed, continued, or maintained under this Act in any parish or place in which there shall be no local board of health;

Or shall wash, cleanse, throw or cause to enter therein any animal, rubbish, filth, stuff, or thing of any kind whatsoever;

Or shall cause, or permit, or suffer to run or be brought therein the water of any such sewer, drain, engine, or boiler, or other filthy, unwholesome, or improper water;

Or shall do anything whatsoever whereby any water belonging to the said local board, or under their management or control, or whereby any water of or contained in any such reservoir, conduit, aqueduct, or other waterworks so constructed, continued, or maintained in any such parish or place aforesaid shall be fouled,

Shall for every such offence forfeit a sum not exceeding five pounds, and a further sum of twenty shillings for each day whilst the offence is continued after written notice in that behalf; . . . . . .

And whosoever, being proprietor of any gasworks, or being engaged or employed in the manufacture or supply of gas, cause or suffer to be brought to or to flow into any stream, reservoir, conduit, aqueduct, or waterworks belonging to or under the management or control of the said local board, or into any drain or pipe communicating therewith, any washing or other substance produced in the manufacture or supply of gas, or shall wilfully do any act connected with the manufacture or supply of gas whereby the water in any such stream, reservoir, aqueduct, or waterworks is fouled, shall forfeit to the said local board for every such offence the sum of two hundred pounds, and after the expiration of twenty-four hours' notice in writing from them on this behalf a further sum of twenty pounds for every day during which the offence is continued, or during the continuance of the act whereby the water is fouled.

Nuisances' Removal Act, 1855.
(18 & 19 Vict. c. 121.)

Section 23.—Any person or company engaged in the manufacture of gas who shall at any time cause or suffer to be brought or to flow into any stream, reservoir or aqueduct, pond, or place for water, or into any drain communicating therewith, any washing or other substance produced in making or supplying gas, or shall wilfully do any act connected with the making or supplying of gas whereby the water in any such stream, reservoir, aqueduct, pond, or place for water, shall be fouled, shall forfeit for every such offence the sum of two hundred pounds.

The Sewage Utilisation Act, 1865.
(28 & 29 Vict. c. 75.)

Section 10.—A sewer authority, with the sanction of Her Majesty's Attorney-General in England, may . . . . take

such proceedings by indictment, bill in chancery, action, or otherwise, as it may deem advisable for the purpose of protecting any watercourse within its jurisdiction from pollution arising from sewage either within or without its district; and the costs of and incidental to any such proceedings, including any costs that may be awarded to the defendant, shall be deemed to be expenses properly incurred by the sewage authority in carrying into effect the purposes of this Act.

Section 11.—Nothing contained in this Act, or in the Acts referred to therein, shall authorise any sewer authority to make a sewer so as to drain direct into any stream or watercourse.

The Public Health Act, 1858.
(21 & 22 Vict. c. 98.)

Section 73.—Nothing in this Act, or any Act incorporated therewith, shall be construed to authorise any local board to injuriously affect any reservoir, river, or stream, or the feeders of any reservoir, river, or stream, or the supply, quality, or fall of water contained in any reservoir, river, or stream, ... unless such board shall have first obtained the consent in writing of such company or individuals so entitled as aforesaid.

EXAMINATION OF DRINKING WATER.

It is desirable, when proceeding to the examination of drinking water presumed to be contaminated, to follow a well-known method; and with the permission of the authors we cite the directions which are given by Messrs. Wanklyn and Chapman in their work on Water Analysis:—

Examine the water as to clearness. This is best done by filling a good-sized flask, 1200 to 1500 c.c. capacity, with the water. The flask is now to be held in front of a dark-coloured or black wall, a strong light falling on the flask

from one side or from above. Any small particles floating in the water will now become readily visible. Care must be taken not to confound minute bubbles of air with suspended matter.

The colour of the water should also be noted. It is best seen by placing the flask containing the water on a sheet of white paper, and placing by its side a similar flask filled with pure distilled water. The two flasks should stand in good diffused daylight. Very minute shades of colour can be seen in this way, and as the glass of which flasks are made is very thin, and but very slightly coloured, we are not liable to mistake the colour of the vessel for that of the water. Dr. Letheby recommends the use of a long cylinder for the purpose of ascertaining the colour, and if such a cylinder of clear thin colourless glass can be obtained, it is a very good plan. Unfortunately, however, most cylinders are made of thick glass, with a decided purplish or green colour. Such vessels are very liable to mislead.

Should the water contain much suspended matter, or be very dark in colour, it may, we think, be said to be unfit for drinking purposes in its then state, though filtration may render it quite good.

Observe the smell of the water. This is best done by shaking up some of the water in a flask with a short and wide neck about one-third full, and then inhaling the air in the upper part of the flask. Should it smell disagreeable in any high degree, the water may be said to be unfit to drink.

Now warm the water slightly and smell again. Warming will often bring out the smell of a water when none could be detected in the cold.

Now add a little caustic potash to the warm water; should this cause any unpleasant smell, we may be pretty sure that the water contains organic matter in some quantity. Notice if a precipitate occurs on the addition of the potash; if so, whether much or little, whether coloured or white. The occurrence of a precipitate indicates hardness; the colour may either be caused by organic colouring matter in the water or by iron.

Add Nessler test to about 100 c.c. of this water, either in a cylinder or small flask. Should this produce a yellow

or brown colour, or a brown precipitate, the water contains ammoniacal salts. This is a most suspicious circumstance, and is almost enough in itself to condemn the water for drinking purposes.

Add iodide of potassium, acetic acid, and starch paste to 100 c.c. of the water. A blue colour indicates nitrites; this also is a most suspicious circumstance, and should the colour be at all deep, the water can hardly be fit to drink. It is to be noted that inasmuch as iodide of potassium often contains iodate, the acetic acid, starch, and iodide should be mixed before adding them to the water, so as to make sure that the colour is really produced by the water, and not by any iodate that the reagent may contain.

Boil about 100 c.c. of this water in a flask with a few drops of sulphuric acid, remove from the source of heat, and add sulphuretted hydrogen water. Should a brown or black colouration be produced, the presence of lead or copper may be inferred, and the water condemned (bismuth, mercury, and silver, would of course give the same reaction, but are hardly likely to be present). Should no colour be detected, add a little ammonia or potash. Should this produce a blackish precipitate, iron is almost sure to be present.

Boil a little of the water for a few moments with red litmus. Should the litmus not turn blue, repeat the operation with blue litmus. We learn from this whether the water has an alkaline or an acid reaction. This observation is seldom of importance except when the water comes from a manufacturing district; it is then often of the greatest value.

The preliminary examination described above takes up a very short time, and gives us much information. It does not require more than 500 c.c. of water, and may be conducted with less. The water used in the examination for clearness, colour, &c. is not reckoned, because it can be employed afterwards in other parts of the analysis.

We may here remark that, if a water contains suspended matter, it should, in our opinion, be analysed with that suspended matter in it. If the nature and quantity of the suspended matter be required, the water should be examined both before and after filtration. The difference between the

two results is the value for the suspended matter. This double examination extends only to the total solid residue and the organic matter. The nitric acid and chlorine will not be affected by the suspended matter. A slight difference will sometimes be found between the hardness before and after filtration, but it is not of sufficient moment to render a second determination requisite.

Nessler's reagent is prepared as follows:—Dissolve 35 grammes of iodide of potassium in a small quantity of distilled water, and add to it a strong watery solution of bichloride of mercury (corrosive sublimate), which will cause a red precipitate that disappears on shaking up the mixture. Add the solution of bichloride of mercury, carefully shaking up as that liquid is added, so as to dissolve the precipitate as fast as it is formed. After continuing the addition of the bichloride of mercury for some time, a point will ultimately be reached at which the precipitate will cease to dissolve. When the precipitate begins to be insoluble in the liquid, stop the addition of the bichloride of mercury. Filter. Add to the filtrate 120 grammes of caustic soda in strong aqueous solution (or about 160 grammes of potash).

After adding the solution of alkali as just described, dilute the liquid so as to make its volume equal 1 litre. Add to it about 5 c.c. of a saturated aqueous solution of bichloride of mercury, allow to subside, and decant the clear liquid.

The Rivers' Pollution Commission have laid down the following particulars for enquiry into the quality of potable waters, and have framed the tables in their report upon them:—

1. Organic carbon } both due to organic substance.
2. „ nitrogen }
3. Ammonia.
4. Nitrogen in combination with oxygen, as in nitric and nitrous acids.
5. The total combined nitrogen.
6. Chlorine.
7. Hardening constituents.

The same Commission, in a review of the subject in 1870, arrived at the following conclusions, and consider any liquid as unfit to enter a stream which has the following elements in 10,000 gallons:—

1. Containing in *suspension* more than 3 parts by weight of dry mineral matter, or 1 part by weight of dry organic matter.
2. Containing in *solution* more than 2 parts by weight of organic carbon, or 0·3 part by weight of organic nitrogen.
3. Which shall exhibit by daylight a distinct colour when a stratum of it 1 inch deep is placed in a white porcelain or earthenware vessel.
4. Containing in *solution* more than 2 parts by weight of any metal, except calcium, magnesium, potassium, and sodium.
5. Containing, whether in *solution or suspension*, in chemical combination or otherwise, more than 0·05 part of metallic arsenic.
6. Containing, after acidification with sulphuric acid, more than 1 part by weight of pure chlorine.
7. Containing more than 1 part by weight of sulphur in the condition either of sulphuretted hydrogen or of a soluble sulphuret.
8. Possessing an acidity greater than that which is produced by adding 2 parts by weight of real muriatic acid to 1000 parts of distilled water.
9. Possessing an alkalinity greater than that produced by adding 1 part by weight of dry caustic soda to 1000 parts by weight of distilled water.

As a guide to the local authority and medical officer of health, the following examples of the best drinking waters in England, and perhaps in Europe, may be cited with their composition so far as refers to their chief ingredients:—

(No. 13.)

POUNDS IN 10,000 GALLONS OR 100,000 LBS.

	Total Solids.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen in Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.	
Bassenthwaite	4·64	·154	·037	·0	·0	·037	1·29	2·83	
Buttermere	3·56	·127	·040	·004	·0	·043	·89	1·01	
Cocker	4·62	·069	·022	·001	·0	·023	1·09	2·15	
Crawley Burn	11·28	·187	·031	·001	·0	·032	1·04	6·08	
Crummock Water	4·06	·183	·055	·007	·0	·061	·89	1·30	
Derwentwater	6·56	·218	·043	·001	·0	·044	1·29	1·74	
Derwent	6·0	·219	·041	·004	·0	·044	1·09	3·37	
Ennerdale	2·16	·042	·017	·0	·0	·017	·99	1·45	
Grassmere	4·18	·235	·05	·001	·0	·051	·79	2·70	
Kent	6·48	·149	·020	·0	·044	·064	·90	3·90	
Rhine	15·80	·108	·012	·003	·0	·015	·20	10·76	hard water
Rivington Pike	8·48	·243	·031	·004	·0	·034	1·53	3·72	
Rydal	4·44	·254	·043	·002	·0	·045	·69	3·10	
Severn, above Newtown	6·60	·123	·016	·003	·010	·028	1·35	3·09	
Skiddaw	4·34	·132	·024	·001	·0	·025	1·09	3·37	
Swanston Water	12·70	·378	·059	·001	·0	·060	1·39	6·22	
Windermere	5·78	·299	·076	·002	·018	·096	·99	4·04	
Zug	13·20	·149	·026	·0	trace	·026	·27	9·03	hard water
Zürich	14·30	·092	·009	·002	·0	·011	·17	10·61	hard water

The only impurities in water which demand immediate attention are the nitrogenous, as ammonia and albumenised ammonia, that is to say, the products of animal excretions or of recent decomposition.

The smell, colour, and taste of the water will generally indicate recent sewage contamination, but the free nitrogen will be at once ascertained by its decolorising a solution

of permanganate of potash, a portion of which may be carried by the medical officer. If any of these tests reveal the presence of such impurity, a portion of the water should be taken for more careful analysis.

It may be desirable to repeat that the presence of nitrates and nitrites alone will not prove that the water is then capable of exerting an injurious influence on health, and such water may not reveal the presence of impurities to the sight, smell, or taste.

Decomposing matters in dung-hills, cesspools, and pig-styes may have influence, as they foul drinking water or contaminate the atmosphere, but their mere presence must not be taken as necessarily a cause of disease. A due estimation of their power to effect the latter in a position which might have acted upon the sick person and an examination of the drinking water should be made. Such matters are not unfrequently found in cisterns from which the drinking water is obtained, or in the vessels used to convey the water. Wherever dung-hills, cesspools, or pigstyes, are found near to a well, or on examination the soil around the mouth of the well is moist, or a drain, whether open or closed, is known to be near to it, or the level of the mouth of the well is below or not above that of the surrounding soil, there will be a presumption of contamination from surface drainage.

The following information will be useful to medical officers of health, both as indicating the best methods of water analysis and as affording numerous examples of the composition of drinking water actually in use. They have been compiled from the reports of the Rivers' Pollution Commission, Wanklyn and Chapman's work on Water Analysis, our work on Foods in the International Scientific Series,

and other sources. We will first premise the analysis of rain-water, extracted from Dr. Angus Smith's admirable book, and then proceed to consider lake, river, and well waters.

As the quantities of so-called impurities in rain-water are very small, Dr. Angus Smith has shown them in comparative and not absolute terms, taking for his unit the composition of the water found at Valentia, in Ireland.

(No. 14.)

	Comparative		
	Acidity.	Ammonia.	Albumenised Ammonia.
Ireland—Valentia	None	1·0	1·0
England—Inland country places	None	5·94	3·21
,, Sea coast	None	10·55	—
Scotland—Sea coast, country places, west	1·0	2·69	3·09
,, Inland country places, west	2·27	2·96	1·15
,, Sea coast, country places, average	9·30	4·10	3·11
,, Sea coast, country places, east	17·61	5·51	3·1
,, Towns (not including Glasgow)	22·85	21·22	6·23
German specimens	9·22	—	3·59
Darmstadt	12·56	—	—
London, 1869	27·97	19·17	6·03
St. Helen's	28·71	25·33	6·76
Manchester, 1869	60·13	35·33	6·38
,, average of 1869–70	73·44	35·94	7·38
,, 1870	86·76	36·54	8·38
Runcorn	82·40	25·72	5·59
Liverpool	83·46	29·89	4·67
Glasgow	109·16	50·55	8·22
England—Towns	61·57	28·67	6·29

A.—Mineral Matters.

The following is the total solid residue and the degree of hardness in the waters of some English, Scotch, and Swiss lakes.

(No. 15.)

	In 100,000 lbs. of Water.	
	Solid Residue. lbs.	Degree of Hardness, or lbs. of Mineral Matter.
Bassenthwaite Lake	4·64	1·74
Buttermere	3·56	4·04
Crummock Water	4·06	1·01
Derwent Water	6·56	1·3
Ennerdale Lake	2·16	1·45
Grassmere	4·18	2·7
Windermere	5·78	3·1
Bala Lake	2·79	0·4
Banw and Eira	4·86	2·0
Colinton Water	14·1	9·17
Lake of Geneva	15·2	—
Swanston Water	12·7	6·22
Zürich Lake	14·3	10·61
Zug	13·2	9·03

Certain very deep wells give the following quantities :—

(No. 16.)

	In 100,000 lbs. of Water.	
	Solid Residue. lbs.	Degree of Hardness, or lbs. of Mineral Matter.
Deal	33·24	26·31
London—Royal Mint	83·96	17·48
,, Trafalgar Square	83·4	5·92
Northampton	57·76	10·33
Tring	28·6	26·33

Springs and other wells of less depth :—

(No. 16A.)

Ben Rhydding	8·0	—
Critchmere springs	6·24	2·6
Malvern—Holywell	9·37	—
,, St. Ann's	5·68	—
Spring at Whitby	7·6	2·8

Great collecting areas away from the habitations of men, where the chances of pollution seem to be reduced to a minimum, give the following numbers in 100,000 lbs. or 10,000 gallons of water :—

(No. 17.)

	Total Solid Residue. lbs.	Degree of Hardness, or lbs. of Mineral Matter.
Batley gathering ground	7·60	3·33
Halifax gathering ground	8·16	3·20
Manchester reservoirs, in Derbyshire	6·2	3·73
Rivington Pike	8·48	3·72
Skiddaw	4·34	3·37

Rivers which supply water to important towns have the following :—

(No. 18.)

	In 100,000 lbs. of Water.	
	Total Solid Residue. lbs.	Degree of Hardness, or lbs. of Mineral Matter.
Avon, at junction with Frome	11·1	0·35
Calder, Rochdale road	7·30	3·77
Cocker	4·62	2·15
Crawley Burn	11·28	6·08
Danube, near Vienna	14·14	—
Derwent	6·0	3·37
Frome, below last mill	11·6	0·63
Garonne, at Toulouse	13·67	—
Irk (one of its sources)	19·78	—
Irwell, near its source	7·80	—
Kent, above Carpet Works	3·3	—
,, below Kendal and Low Mills	4·2	Trace
Medlock, near its source	12·80	—
Mersey, above Warrington	28·36	2·30
,, below Warrington	29·04	1·80
Severn, above Newtown	8·6	3·09
,, in Wales	3·87	0·9
Thames, at Hampton	27·87	Trace
,, head waters	28·25	—

The hardness of the Thames water supply to London is about 14 degrees.

But there are sources in which the quantity of mineral matter far exceeds those already indicated. Thus:—

(No. 19.)

	In 100,000 lbs. of Water.	
	Solid Residue. lbs.	Degree of Hardness, or lbs. of Mineral Matter.
Bedford—Pillory pump . .	140·74	54·51
,, Shallow well from upper oolite . .	72·46	40·77
Bristol—Spring in All Saints' Lane . . .	127·28	66·92
,, Water supply . .	28·66	24·46
Cornbrook	76·90	38·79
,, near junction with Irwell	142·90	64·40
Croal, near Bolton . . .	69·20	25·67
Deal—Deep chalk well at Hill's brewery . . .	202·14	47·25
Norwich—Artesian well, 400 ft. deep . . .	38·14	29·64
Rochdale spring . . .	37·04	14·38
Runcorn public fountain . .	60·80	25·34
Worthing—New deep well in chalk. . . .	32·44	24·69

B.—Nitrogen.

Nitrogenous matter appears in drinking water in four forms, viz.:—

1. As free gas;
2. In combination with oxygen as nitrates and nitrites;
3. In combination with hydrogen as ammonia;

4. In combination with carbon, oxygen, and hydrogen, in other organic forms of which albumen is taken as the type, and hencè called albumenised ammonia.

It was not found in the following sources at the time the examinations were made for the Rivers' Pollution Commission.

Westbury (old deep well), Bedford (Pillory pump), Newcastle-on-Tyne (supply from Whittle Dean), Sunderland (deep wells in dolomite), Norwich (from "Broads" and artesian well), Colinton Water, Bassenthwaite, Ennerdale, Dublin (Custan's well), Deal (from deep well), Zug, Frome, Avon (above Lucyford), and the water supply of Gloucester and part of Bath, and Windsor well, near Liverpool.

As to the English lakes, it was only 0·001 in 100,000 parts, in Grassmere and Derwent Water; 0·002 in Rydal Lake and Windermere; 0·004 in Buttermere, and 0·007 in Crummock Water.

There are, however, other sources, where the proportion is increased a hundred or a thousandfold, and such are exclusively those which are contaminated with sewage or manufacturers' refuse; so that the Medlock, just above its junction with the Irwell, had 1·116 lbs. in 100,000 lbs. of water.

Its presence in a very minute quantity is tolerably uniform in the best drinking waters, and is represented in the following table under the two heads of organic carbon and organic nitrogen, two of its component parts.

(No. 20.)

POUNDS IN 100,000 LBS. OF WATER.

	Organic Carbon.	Organic Nitrogen.
Buttermere	0·127	0·040
Caterham	0·020	0·006
Colinton Water	0·203	0·042
Coniston Water	0·085	0·017
Crawley Burn	0·187	0·031
Crummock	0·183	0·55
Deal	0·032	0·022
Derwent Water	0·218	0·043
Grassmere Lake	0·235	0·050
Katrine	0·256	0·008
Manchester	0·183	0·009
Northampton	0·168	0·024
Otter Spring	0·026	0·012
Rivington Pike	0·243	0·031
Royal Mint (well)	0·195	0·025
Rydal	0·254	0·043
Swanston	0·378	0·059
Thames at Hampton	0·260	0·024
Trafalgar Square (well)	0·150	0·012
Tring, deep well	0·036	0·010
Welsh waters	0·289	0·004
Windermere	0·299	0·076
Zug	0·149	0·026
Zürich	0·92	0·009

But there are sources of water in which the quantity is extremely great, and from the use of which the most important diseases have been known to follow. Such are referred to in the following table :—

(No. 21.)

POUNDS IN 100,000 LBS. OR 10,000 GALLONS OF WATER.

	Organic Carbon.	Organic Nitrogen.
Cornbrook, before junction with Irwell	4·129	0·383
Darweer, below Blackburn	2·127	0·295
Irk, below Blackburn	2·452	0·352
Irwell, at Throsle-next-Weir	2·104	0·248
Roch, above Bury	4·518	0·288

Two rival processes are in general use at the present time to determine the amount of nitrogenous matter, omitting, however, free nitrogen, since it is innocuous.

The quantity of nitrates and nitrites is ascertained by converting them into ammonia by means of metallic aluminium, acting upon them in the cold, and in a strongly alkaline solution, and estimating the nitrogen from the ammonia. The following is Chapman's modification of Schulze's process:—

The process is carried out as follows:—100 c.c. of the water are introduced into a non-tubulated retort, and 50 to 70 c.c. of a solution of caustic soda added. The caustic soda must be free from nitrates, and the strength of the solution should be such that 1 litre contains 100 grammes of caustic soda. The contents of the retort are to be distilled until they do not exceed 100 c.c., and until no more ammonia comes over; that is, until the Nessler test is incapable of detecting ammonia in the distillate. The retort is now cooled, and a piece of aluminium introduced into it (foil will answer very well with dilute solutions, but we much prefer thin sheet aluminium in all cases). The neck of the retort is now inclined a little upwards, and its mouth closed with a cork, through which passes the narrow end of a small tube filled with broken-up tobacco-pipe, wet either with water or, better, with very dilute hydrochloric acid free from ammonia. This tube need not be more than an inch and a half long, nor larger than a goose-quill. It is connected with a second tube containing pumice-stone moistened with strong sulphuric acid. This last tube serves to prevent any ammonia from the air entering the apparatus, which is allowed to stand in this way for a few hours or overnight. The contents of the pipe-clay tube are now washed into the retort with a little distilled water, and the retort adapted to a condenser, the other end of which dips beneath the surface of a little distilled water free from ammonia (about 70 to 80 c.c.).* The contents of the retort

* Condensers are very apt to contain a trace of ammonia if they have

are now distilled to about half their original volume; the distillate is made up to 150 c.c.; 50 c.c. of this are taken out, and the Nessler test added to them. If the colour so produced is not too strong, the estimation may be made at once; if it is, the remainder of the distillate must be diluted with the requisite quantity of water.

Frankland and Armstrong adopt a different process, and destroy the nitrates and nitrites by sulphuric acid in the following manner:—

Estimation of Nitrogen in the Form of Nitrates and Nitrites.—The following is the mode in which this process is applied to the estimation of nitrogen existing as nitrates and nitrites in potable waters:—The solid residue from the half-litre of water used for determination No. 1 (estimation of total solid constituents) is treated with a small quantity of distilled water; a very slight excess of argentic sulphate is added to convert the chlorides present into sulphates, and the filtered liquid is then concentrated by evaporation in a small beaker, until it is reduced in bulk to two or three cubic centimetres. The liquid must now be transferred to a glass tube, furnished at its upper extremity with a cup and stopcock, previously filled with mercury at the mercurial trough, the beaker being rinsed out once or twice with a very small volume of recently boiled distilled water, and finally with a pure and concentrated sulphuric acid, in somewhat greater volume than that of the concentrated solution and rinsings previously introduced into the tube. By a little dexterity it is easy to introduce successively the concentrated liquid, rinsings, and sulphuric acid into the tube by means of the cup and stopcock, without the admission of any trace of air. Should, however, air inadvertently gain admittance, it is easily removed by depressing the tube in the mercury trough, and then momentarily opening the stopcock. If this be done within a minute or two after the introduction of the sulphuric acid, no fear need be

been standing all night, and must, therefore, be washed out with the utmost care. We prefer to distil a little water through them until ammonia can be no longer detected in the distillate.

entertained of the loss of nitric oxide, as the evolution of this gas does not begin until a minute or so after the violent agitation of the contents of the tube.

The acid mixture being thus introduced, the lower extremity of the tube is to be firmly closed by the thumb, and the contents violently agitated by a simultaneous vertical and lateral movement, in such a manner that there is always an unbroken column of mercury, at least an inch long, between the acid liquid and the thumb. From the description, this manipulation may appear difficult, but in practice it is extremely simple, the acid liquid never coming in contact with the thumb. In about a minute from the commencement of the agitation a strong pressure begins to be felt against the thumb of the operator, and the mercury spurts out in minute streams, as nitric oxide gas is evolved. The escape of the metal should be gently resisted, so as to maintain a considerable excess of pressure inside the tube, and thus prevent the possibility of air gaining access to the interior during the shaking. In from three to five minutes the reaction is completed, and the nitric oxide may then be transferred to a suitable measuring apparatus, where its volume is to be determined over mercury. As half a litre of water is used for the determination, and as nitric oxide occupies exactly double the volume of the nitrogen which it contains, the volume of nitric oxide read off expresses the volume of nitrogen existing as nitrates and nitrites in one litre of water. From the number so obtained the weight of nitrogen in these forms in 100,000 parts of water is easily calculated.

Ammonia is very readily and neatly determined by the use of a reagent invented by Nessler, and hence called Nessler's test, and the process Nesslerising. The reagent causes a brown coloration or deposit when ammonia is present.

As the subject is of great importance, and the use of the test not difficult, it seems desirable to extract the directions given in Wanklyn and Chapman's practical treatise on Water Analysis.

Use of the Test.—When a small quantity of the reagent is added to a solution containing a trace of ammonia, a yellow or brown *coloration* is produced. If more ammonia is present, a *precipitate* is formed; and if ammonia be added to the reagent, a precipitate is almost always obtained.

In order to use the test quantitatively, the following things are required:—

(1) Distilled water, free from ammonia.
(2) Standard solution of ammonia.
(3) A burette to measure the standard ammonia.
(4) A pipette for the Nessler reagent. It should deliver about 1½ c.c. (about 25 minims or drops).
(5) Glass cylinders that will contain about 160 c.c.; they are graduated at 100 c.c. and at 150 c.c.

(1) Distilled water of sufficient purity is generally to be obtained when a considerable quantity of water is distilled. The first portions of distilled water usually contain ammonia. After a while, on continuing the distillation, the water usually distils over in a state of tolerable purity, but towards the end the ammonia will again appear in the distillate. By collecting the middle portion of the distillate apart from the rest, it will usually be easy to obtain distilled water of sufficient purity. In order to be available, the distilled water should not contain so much as $\frac{1}{100}$ of a milligramme of ammonia in 100 c.c. of water. If there is no opportunity of distilling a large quantity of water, and taking the middle fraction of the distillate, it may be necessary to re-distil distilled water of ordinary quality: the first part of the distillate will be ammoniacal; after that, there will be water free from ammonia.

(2) The standard ammonia should contain $\frac{1}{100}$ of a milligramme of ammonia in 1 cubic centimetre of water. It is made by dissolving 0·03882 gramme of sulphate of ammonia in a litre of water. If chloride of ammonium be taken, the quantity of the chloride to be dissolved in a litre of water is 0·0315 gramme. It will be found most convenient in practice to keep a solution of ten times this strength (0·3882 gramme of sulphate of ammonia in a litre of water), and to dilute it when required for use.

In order to estimate ammonia, fill one of the cylinders up

to 100 c.c. with the solution to be examined, and add 1½ c.c. of Nessler reagent by means of the pipette. Observe the colour, and then run as much of the standard solution of ammonia as may be judged to correspond to it into another cylinder containing distilled water, fill up with water to 100 c.c., and add 1½ c.c. of Nessler test. Allow the liquids to stand for ten minutes. If the coloration is equal, the amount of standard ammonia used will represent the ammonia in the fluid under examination. If not, another cylinder must be filled, employing a different amount of the standard ammonia, and this must be repeated until the colours correspond. It is very seldom necessary to make more than two such comparative experiments; and with a little practice, the operation of "Nesslerising" will become very easy and rapid. With regard to the limits of the readings, it is not difficult to recognise $\frac{1}{400}$ of a milligramme of ammonia in 100 c.c. of water, and the difference between $\frac{19}{100}$ and $\frac{20}{100}$ of a milligramme should be visible. It will be observed that $\frac{1}{100}$ milligramme of ammonia will be more visible in 50 c.c. of water than in 100 c.c. of water; so that when it is desirable to detect the very minutest quantities, concentration of NH_3 in a small bulk of water is to be recommended.

With regard to the superior limit. When the ammonia becomes too concentrated, precipitation occurs. Different samples of Nessler test will sustain different quantities of NH_3 without precipitation.

The presence of a great number of substances in aqueous solution containing ammonia will interfere with the indication of the Nessler reagent, and it is always desirable to have the ammonia in pure distilled water, if that be possible. In order to do so, the solution containing the ammonia should be distilled with a little alkali, and the Nessler reagent applied to the distillate.

If a water contains much carbonic acid, it is desirable to add a little potash to the water before adding the Nessler test. Thus, in estimating the ammonia in the distillate from soda water, too small a number will be obtained if this precaution be neglected.

When there is a necessity for the use of the Nessler test without previous distillation, a special device has to be

resorted to in order to get rid of the disturbing influence on the Nessler test of the substances dissolved. Thus:—

Take 500 c.c. of water, add a few drops of solution of chloride of calcium, then a slight excess of potash. Filter. Put it into a retort and distil until the distillate comes over, free from ammonia, then make up the contents of the retort with distilled water to their original volume, viz. 500 c.c. Now take 200 c.c. of the original water, treat it with chloride of calcium and potash, as before. Then filter, care being taken to have the filter-paper well washed before commencing the filtration. In this way two samples of water are obtained, the one with the ammonia, as in the original water, and the other without the ammonia, but in every other respect the same as the former. This second portion of water is to be used in the place of distilled water to make the Nessler comparisons; as both samples contain tbe same impurities, they will affect the tint of the Nessler test in the same manner. Thus the error arising from the presence of salts, &c. is avoided.

The following table will be of use in converting observed amounts of ammonia into nitrogen or nitric acid:—

(No. 22.)

TABLE SHOWING THE AMOUNT OF NITROGEN AND NITRIC ACID CORRESPONDING TO DIFFERENT AMOUNTS OF AMMONIA.

Ammonia, NH_3.	Nitrogen.	Nitric Acid, HNO_3.
1	0·89	3·71
2	1·78	7·41
3	2·67	11·12
4	3·56	14·82
5	4·44	18·53
6	5·33	22·24
7	6·22	25·94
8	7·11	29·65
9	8·00	33·35
10	8·89	37·06
11	9·78	40·76
12	10·67	44·47
13	11·56	48·18
14	12·44	51·88
15	13·33	55·59
16	14·22	59·29

Ammonia, NH_3.	Nitrogen.	Nitric Acid, HNO_3.
17	15·11	63·00
18	16·00	66·71
19	16·89	70·41
20	17·78	74·12
21	18·67	77·82
22	19·56	81·53
23	20·44	85·24
24	21·33	88·94
25	22·22	92·65

The organic matter is now generally determined by one of two methods.

Frankland and Armstrong first destroy the nitrates by the aid of sulphate of soda, leaving ammonia and organic matter in solution. They then evaporate the water so treated to dryness in the water-bath, and afterwards burn the dry residue with oxide of copper and chromate of lead, and collect and estimate the carbonic acid and nitrogen. This is a somewhat laborious process, and it is alleged that there are two tendencies to error, one in not entirely destroying the nitrates and the other in destroying a part of the organic matter, and thus that the limit of error is often as large as the whole quantity of nitrogen in good drinking water.

The ammonia process consists in at once converting the organic matter into ammonia, and estimating the nitrogen contained in it, and it is asserted that, when the apparatus is ready, the whole determination can be made in less than half an hour.

The following are the details of the method :—

Half a litre of water is taken and placed in a tubulated retort, and 15 c.c. of a saturated solution of carbonate of soda added. The water is then distilled until the distillate begins to come over free from ammonia (*i.e.* until 50 c.c. of distillate contain less than $\frac{1}{100}$ of a milligramme of NH_3).

A solution of potash and permanganate of potash is next added. This solution is made by dissolving 200 grammes of solid caustic potash and 8 grammes of crystallised permanganate of potash in a litre of water. The solution is boiled to expel any ammonia, and both it and the solution of carbonate of soda ought to be tested on a sample of pure water before being used in the examination of water.

50 c.c. of this solution of potash and permanganate should be used with half a litre of the water to be tested.

The distillation is continued until 50 c.c. of distillate contain less than $\frac{1}{100}$ milligramme of ammonia.

Both sets of distillate have the ammonia in them determined by means of the Nessler test, as described above.

No matter how good the water may be, it is desirable never to distil over less than 100 c.c. with carbonate of soda, and not less than 200 c.c. after the addition of the potash and permanganate of potash.

It will easily be understood that the greatest cleanliness is requisite in carrying out this process. The Liebig's condenser is especially liable to contain traces of ammonia, and should be cleaned out immediately before being used. The best way of effecting this is by distilling a little water through it. In boiling the contents of the retort, it is well to use the naked flame placed *quite close* to the retort, so as not to heat one spot only. We are in the habit of using a large Bunsen burner placed close to the bottom of the retort. Persons who are not in the habit of distilling with the naked flame will probably find an Argand gas-lamp with a metallic chimney to be the more convenient source of heat.

With regard to the retort itself, it should be capable of holding about 1500 c.c. when in position for distillation and filled up, so as to run over. The tubulure should be so situated as to admit of the charge being poured in when the retort is *in situ* for distillation. The charge is to be introduced by means of a funnel, so as to avoid dirtying or cracking the retort.

Very bad specimens of water may be conveniently examined as follows:

About 600 c.c. of recently distilled water are put into the retort, and distilled with 15 c.c. of saturated solution of carbonate of soda, until the distillate comes over ammonia-

free. Then 100 c.c. of the very bad specimen of water are added, and the operation proceeded with, as has been described. Of course the values must be multiplied by 10, in order to obtain the quantities of ammonia yielded by a litre of the specimen.

As has been already mentioned, the first portion of ammoniacal distillate contains both the free ammonia of the water and that obtained from the decomposition of any urea that may exist in the water. Usually it is quite unnecessary to make any separation of the free ammonia from the ammonia present as urea. In the case, however, of very foul water, as, for instance, in the Thames water taken at London Bridge, it is sometimes worth while to make this distinction. When this is desired, a determination of the free ammonia actually present in the water must be made. The difference between the amount of ammonia evolved by carbonate of soda and the ammonia present as such is equal to the ammonia obtained from the urea.

C.—Chlorine.

This substance is present in drinking waters in the form of common salt, and may be a normal constituent, as in salt springs, or an abnormal one, derived chiefly from the urine of animals which has percolated the soil or otherwise gained access to the water supply.

The following shows the quantity of chlorine which is present in the more important sources of drinking water :—

(No. 23.)

IN 100,000 LBS.

	Lbs.
Lake of Zürich	0·17
,, ,, Zug	0·27
Bala Lake	0·70
The Rhine, above Schaffhausen	0·20
Grassmere Lake	0·79
Rydal Lake and Ulleswater	0·69
Windermere	0·99
Buttermere, Colinton Water, and Crummock Water	0·89

	Lbs.
Ennerdale and Lancaster gathering grounds	0·99
Derwent Water and Bassenthwaite	1·29
Cocker, Derwent, and Skiddaw	1·09
Coniston Water	1·89
Thames, at Kew	0·84
,, ,, London Bridge	1·83
Rhine, at Basle	0·10
,, ,, Bonn	1·01
Elbe, at Hamburg	2·75
Rivington Pike	1·53
Tring, deep well	1·39

The next table indicates a few sources which must be regarded with great suspicion on several grounds.

(No. 24.)

POUNDS IN 100,000 LBS. OF WATER.

	Nitrogen as Nitrates and Nitrites.	Total Nitrogen.	Chlorine.
Liverpool—Bevington Bush well, 1868	8·678	8·721	12·61
,, Soho well, 1868	2·195	2·220	7·51
,, Water Street well	1·975	1·989	7·94
Congleton—Town pump	1·076	1·122	3·18
Rochdale—Spring near churchyard	1·813	1·860	2·98
Leyland	2·466	2·524	—
Kidderminster—Shallow well, 1870	3·069	3·222	8·38
,, Another well,	5·322	5·378	8·20
Leamington—Mr. Jones' well, 1870	6·086	6·111	14·20
Durham—Private well	6·268	6·313	9·75
Darlington—Blackwell pump	6·724	6·757	8·45
Kendall—Shallow well	2·465	3·090	17·00
Witney—Well in Wiggin's yard	4·32	4·880	22·90

The spring in All Saints' Yard, Bristol, is a most notable instance of pollution from sewage contamination, and the following number of pounds in 10,000 gallons cannot fail to arrest attention when contrasted with those of pure water :—

(No. 25.)

Bristol	Total solids 127·28	Nitrogen 4·745	Chlorine 7·10
Buttermere	,, 3·56	,, 0·043	,, 0·89

D.—Refuse.

The contamination of streams, and therefore of drinking water, by the refuse of the processes of manufacture prevails exceedingly in Yorkshire and Lancashire, as is illustrated by the instance of the river Irwell.

(No. 26.)

IN 10,000 GALLONS.

	At its Source.	*Below Manchester.*
Solids	7·80 lbs.	55·80 lbs.
Organic carbon	0·187 ,,	1·173 ,,
Organic nitrogen	0·025 ,,	0·332 ,,
Total nitrogen	0·049 ,,	1·648 ,,
Chlorine	1·15 ,,	9·63 ,,
Hardness	3·72 degrees	22·92 degrees.

The examination by the Rivers' Pollution Commission of fifteen samples of waters contaminated by the cotton and woollen mills in Yorkshire showed the following quantities of material in 100,000 lbs. of water, which were thrown into the rivers:—

(No. 27.)

Total solid matters	337	Total combined nitrogen	20·015
Organic carbon	64·783	Metallic arsenic	0·011
Organic nitrogen	10·314	Chlorine	21·94
Ammonia	11·647	Mineral matters	474·84
Nitrogen as nitrates and nitrites	0·041		

They also give a page in their report of 1871, showing in facsimile a letter written with the water of the river Calder at Wakefield, which equals in depth of colour that from a watered ink, and similar examples might have been made from the river water at Bradford.

E.—Lead.

The water mains now in use, whether large or small, are invariably made of cast iron; but the smaller pipes by which the water is conveyed into and distributed through a house are almost universally of lead, and as water containing free carbonic acid and some impurities acts upon lead, it produces a soluble salt, which is drank with the water, and has been known to cause lead poisoning.

But whilst this arrangement is so universal that millions of persons daily drink water thus liable to contamination, the instances in which known disease has occurred are infinitesimally few, and the danger is much less than has been represented. This, however, appears to depend upon three circumstances, viz. the presence of free carbonic acid in water, the action of atmospheric air at the water line when the pipes are not kept full of water, and the introduction of fatty, vegetable, or mineral acid matters into the water by which chemical action is excited.

The quantity of lead in water which will induce derangement of the health has been variously stated. In the well-known case of the family of Louis-Philippe, at Claremont, Dr. De Mussy discovered that there were $\frac{7}{10}$ of a grain per gallon, whilst Adams states that so little as $\frac{1}{100}$ of a grain was injurious, and Angus Smith showed that the like quantity had produced paralysis. The water of Edinburgh, already referred to, is good, notwithstanding the presence of $\frac{1}{140}$ of a grain in a gallon, and Graham believes that more than twice that amount may be taken with impunity. Hence there is no line drawn which indicates safety or danger, and there is much probability in the assertion that a certain quantity may be innocuous to

some persons and injurious to others; but it will be wise to consider any water unfit for use which contains $\frac{1}{10}$ of a grain of lead per gallon.

The presence of lead is determined by passing sulphuretted hydrogen through concentrated water, when a black precipitate is thrown down.

It has been proposed to substitute iron pipes for lead pipes, even in the smallest sizes, and no inconvenience can occur beyond the formation of the red carbonate of iron, and the liability to closure of the pipes from the same substance. The former is reduced to a minimum, and may be practically regarded as *nil* where the water is drawn daily, but where the use of the pipes is at distant intervals, both evils may be expected. The degree of injury to the water from this cause will vary with the amount of iron, and the flavour and colour will reveal its presence before any ill effects on health can be perceived.

QUANTITY REQUIRED.

The quantity of water which should be supplied to each head of the population varies with town and country, and with the care of those who draw it. Where the water is drawn from wells, or otherwise obtained with some trouble, the quantity used is much less than when it can be drawn at any time from the tap; but the chief difference is in that portion which is used for cleaning, and in that which is carelessly wasted.

In some country villages only five gallons per head is supplied daily for all purposes, whilst in towns from four to ten times that amount is provided. Thus in Edinburgh and Glasgow, where the supply is excellent and ample, it amounts

to thirty-five and fifty gallons per head, and in the great manufacturing and other towns of England, as in Lancashire and Yorkshire, Derbyshire and Nottinghamshire, it varies from fourteen to twenty-one gallons. The London supply is not uniform, but it varies between those extremes, and ranges from twenty-one to thirty-four gallons per head. As much water is wasted in towns, there is great reason to believe that the smallest range of supply, viz. about twenty gallons per head, is ample for all domestic purposes, and in villages probably one-half of that amount would suffice.

There is an impression that water should be supplied without stint, and that there are sanitary evils impending when any limit is fixed; but bearing in mind the cost of the supply, and the limits which necessarily exist to the wants of man, such a view is not reasonable. It is true that the basis of calculation is not a very fixed one, for whilst the dietetic wants of all men are much the same, there is much disparity in their ablutionary wants, and still more in the dirtiness of the locality, and the size of the dwelling in relation to the occupants. The basis of the water-rate is not that of the number of individuals using it, but rather that of the size of the house, for in towns it varies with the rental, and not with the population. In villages an uniform rate may be charged under the Public Health Act, whatever may be the number of occupants. There is, moreover, good reason for limiting waste of water in places where there is not a general system of drainage, since there is always some difficulty in disposing of waste water without creating a nuisance, whilst in towns with proper drainage any excess or so-called waste performs a useful function in cleansing the sewers.

The selection of the source of supply is of great moment, and yet the alternatives are usually very few. It must be from three sources, viz. rain water, as caught in vessels and cisterns, surface water, as in the collecting areas and rivers, and springs. The first is quite insufficient, since sufficient storage to meet periods of drought is impossible, but at the same time it is one of the sources which should not be neglected.

The second depends upon the surface levels of the neighbourhood, or the distance from a sufficient lake- or river-supply, and needs good filtration; whilst the third varies with the strata through which the water passes. That from the primitive and metamorphic rocks usually contains the least amount of mineral and may be entirely free from organic matter. The millstone grit and hard oolitic waters are also very pure, whilst loose sand or gravel is apt to be impregnated with organic matter, including the ova of the Entozoa, and to yield water which is not salubrious. But in reference to the latter the danger will vary with situation, and both from them, as also from the sandstones, water of great purity may be obtained.

Water from the chalk formation, including the limestone, magnesian limestone, and lias, is almost invariably hard, from the large quantity of salts of lime which it contains. This is an economical as well as a sanitary question, for the necessity for the use of a large quantity of soap in the operation of cleansing is almost as undesirable as the supply of water which is not of the purest quality as diet. In both these aspects, therefore, the subject must engage the attention of the medical officer of health as a sanitary adviser, and whilst the analyses already given will suffice as a guide in the selection of waters, it may be useful for him to recom-

mend the process by which a large portion of the salts of lime, on which the hardness chiefly depends, may be removed, and the water rendered both more economical and healthful.

SOFTENING HARD WATERS.

The process which has hitherto been adopted was patented by Dr. Clark in 1841, and consists in first determining the degree of hardness of the water by means of the soap test, which he describes, and then adding a quantity of quick-lime, in proportion to the hardness. The following is in part quoted from Chapman and Wanklyn's work already referred to :—

Process for ascertaining the Hardness of Water.

Previous to applying the soap test, it is necessary to expel from the water the excess of carbonic acid; that is, the excess over and above what is necessary to form alkaline or earthy bicarbonates, this excess having the property of slowly decomposing a lather once formed. For this purpose, before measuring out the water for trial, it should be shaken briskly in a stoppered glass bottle half filled with it, sucking out the air from the bottle at intervals by means of a glass tube, so as to change the atmosphere in the bottle; 100 measures of the water are then introduced into the stoppered phial, and treated with the soap test, the carbonic acid eliminated being sucked out from time to time from the upper part of the bottle. The hardness of the water is then inferred directly from the number of measures of soap solution employed, by reference to the subjoined table. In trials of waters above 16 degrees of hardness, 100 measures of distilled water should be added, and 60 measures of the soap test dropped into the mixture, provided a lather is not formed previously. If at 60 test measures of soap test, or at any number of such measures between 32° and 60°, the proper lather be produced, then a final trial may be made in the following manner:—100 test measures of the water under trial are mixed with 100 measures of distilled water, well agitated, and the carbonic acid sucked out; to this

mixture soap test is added until the lather is produced, the number of test measures required is divided by 2, and the double of such degree will be the hardness of the water. For example, suppose half the soap test that has been required correspond to $10\frac{5}{10}$ degrees of hardness, then the hardness of the water under trial will be 21. Suppose, however, that 60 measures of the soap test have failed to produce a lather, then another 100 measures of distilled water are added, and the preliminary trial made, until 90 test measures of soap solution have been added. Should a lather now be produced, a final trial is made by adding to 100 test measures of the water to be tried 200 test measures of distilled water, and the quantity of soap test required is divided by 3; and the degree of hardness corresponding with the third part being ascertained by comparison with the standard solutions, this degree multiplied by 3 will be the hardness of the water. Thus, suppose 85·5 measures of soap solution were required, $\frac{85{\cdot}5}{3} = 28{\cdot}5$, and on referring to the table, this number is found to correspond to 14°, which, multiplied by 3, gives 42° for the actual hardness of the water.

(No. 28.)

TABLE OF SOAP TEST MEASURES, CORRESPONDING TO 100 TEST MEASURES OF EACH STANDARD SOLUTION.

Degrees of Hardness.	Soap Test Measures.	Differences as for the Next Degree of Hardness.
0	1·4	1·8
1	3·2	2·2
2	5·4	2·2
3	7·6	2·0
4	9·6	2·0
5	11·6	2·0
6	13·6	2·0
7	15·6	1·9
8	17·5	1·9
9	19·4	1·9
10	21·3	1·8
11	23·1	1·8
12	24·9	1·8
13	26·7	1·8
14	28·5	1·8
15	30·3	1·7
16	32·0	—

Preparation of the Soap Test.

Sixteen grains of pure Iceland spar (carbonate of lime) are dissolved in pure hydrochloric acid; the solution is evaporated to dryness in an air bath, the residue is again redissolved in water, and again evaporated; and these operations are repeated until the solution gives to test-paper neither an acid nor an alkaline reaction. The solution is made up by additional distilled water to the bulk of precisely one gallon. It is then called the "standard solution of 16 degrees of hardness." * Good London curd soap is dissolved in proof spirit, in the proportion of one ounce of avoirdupois for every gallon of spirit, and the solution is filtered into a well-stoppered phial, capable of holding 2000 grains of distilled water; 100 test measures, each measure equal to 10 water-grain measures of the standard solution of 16 degrees of hardness, are introduced. Into the water in this phial the soap solution is gradually poured from a graduated burette; the mixture being well shaken after each addition of the solution of soap, until a lather is formed of sufficient consistence to remain for five minutes all over the surface of the water, when the phial is placed on its side. The number of measures of soap solution is noticed, and the strength of the solution is altered, if necessary, by a further addition of either soap or spirit, until exactly 32 measures of the liquid are required for 100 measures of the water of 16 degrees of hardness. The experiment is made a second and a third time, in order to leave no doubt as to the strength of the soap solution, and then a large quantity of the test may be prepared; for which purpose Dr. Clark recommends to scrape off the soap into shavings, by a straight sharp edge of glass, and to dissolve it by heat in part of the proof spirit, mixing the solution thus formed with the rest of the proof spirit.

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* The "standard solution of 16 degrees of hardness" may be obtained much more simply by dissolving in a gallon of water a quantity of selenite equivalent to 16 grains of carbonate of lime. As the formula of selenite is $Ca_2SO_42H_2O = 172$, and that of carbonate of lime $Ca_2CO_3 = 100$, the following proportion gives us the quantity of selenite required :—100 : 172 : : 16 : x; $x = 27{\cdot}52$. The selenite should be reduced to fine powder before it is weighed. It dissolves without difficulty. I do not know who first proposed this method.—E. T. C.

This test can be obtained from analytical chemists, and kept ready for immediate use. The hardness having been thus ascertained, one ounce of quicklime should be added to 1000 gallons of water for every degree. It is first to be slacked and stirred in a few gallons of water, and immediately poured into the whole quantity, taking care to repeat the operation, and to thoroughly mix the whole together. The water should then be left at rest, and it will become sufficiently clear in three hours for external use, but it should not be drunk for twelve hours.

The use of hard water is advantageous in conditions where bone-formation is defective, but it is said with reason to produce calculi; and the yet more important conditions known as goitre and cretinism have been attributed to it. It is true that in India both the latter diseases are prevalent upon the limestone, whilst they may be unknown on the primitive and metamorphic rocks; but it is extremely doubtful if so wide a distinction is possible in this country, or indeed in any part of Europe. Goitre prevails in certain parts of England, as in Derbyshire, and cretinism exists in the narrow, close, damp valleys of Switzerland and Italy, amongst a wretchedly poor, ill-fed, and ill-clad people; but both, and particularly the latter, must be due to other causes than that of the quality of the drinking water, and they select their victims, instead of embracing the whole population of any locality. At the same time the weight of evidence is in favour of a connection between goitre and hard water, and shows the desirability of lessening or removing the possible cause.

But whatever may be the source of supply, a system of filtration should be adopted with a view to remove im-

purities. The value of this in reference to suspended matter is very evident, but it is not the less with regard to certain organic matters, for during the process such substances may become oxidised, and rendered innocuous.

The most convenient and effectual filters are—

1. A deep bed of sand, or broken rock and sand, placed in tanks, which will remove suspended matters, and mix the water with air;
2. A bed of charcoal, in powder or in bulk, which will absorb gases, and may also act as an ordinary filter;
3. Small filters filled with animal or vegetable charcoal, or sand;
4. Filters with iron wire, patented by Dr. Medlock, by which, as he alleges, organic matter is decomposed.

In all cases the filtering beds, as well as the small filters, should be covered, so as to further protect the water from contamination, and a renewal of the filtering substance is required at long intervals. A very convenient and efficacious cistern filter is Finch's, and the charcoal filter supplied by the London and General Water Purifying Company, which will supply all the culinary wants of a moderate household.

Filters may be renewed by the following process:—Take two wine-glasses full of Condy's crimson fluid undiluted, with ten drops of sulphuric acid and a table-spoonful of pure muriatic acid, and add them to from two to four gallons of water. Then place the whole in the filter for a few hours, after which pass three gallons of pure soft water through, and it will be ready for use.

Section III.

DECOMPOSING ANIMAL AND VEGETABLE SUBSTANCES AND FILTHY HOUSES.

The Public Health Act, 1848; the Common Lodging-houses Act, 1851; the Nuisances' Removal Act of 1855; and the Sanitary Act of 1866, contain provisions which the medical officer of health will find very useful.

The Public Health Act, 1848.
(11 & 12 Vict. c. 63.)

As to Manure and Refuse.

Section 53.—Where notice has been given by the nuisance authority, *or their officer or officers*, for the periodical removal of manure and other refuse matter from mews, stables, or other premises (whether such notice shall be by public announcement in the locality or otherwise), and subsequent to such notice the person or persons to whom the manure or other refuse matter belongs shall not so remove the same, or shall permit a further accumulation, and shall not continue such periodical removal at such intervals as the nuisance authority *or their officer or officers* shall direct, he or they shall be liable without further notice to a penalty of twenty pounds per day for every day during which such manure or other refuse matter shall be permitted to accumulate, such penalty to be recovered in a summary manner:

Provided always that this section shall not apply to any place where the board of guardians or overseers of the poor are the nuisance authority.

As to Pigstyes and Filth.

Section 59.—And be it enacted that whosoever keeps any swine or pigstye in any dwelling-house, or so as to be a *nuisance* to any person, or suffer any waste or stagnant water to remain in any cellar or place within any dwelling-

house for twenty-four hours after written notice to him from the local board of health to remove the same, and whosoever allows the contents of any water-closet, privy, or cesspool to overflow or break therefrom, shall for every such offence be liable to a penalty not exceeding forty shillings, and to a further penalty of five shillings for every day during which the offence is continued.

And the said local board shall abate or cause to be abated every such nuisance, and the expenses incurred by them in so doing shall be repaid to them by the occupier of the said premises upon which the same exists, and be recoverable from him in the summary manner hereinafter provided.

And if at any time it appears to the inspector of nuisances that any accumulations of manure, dung, soil, or filth, or other offensive or noxious matter whatsoever ought to be removed, he shall give notice to the person to whom the same belongs, or to the occupier of the premises wherein it exists, to remove the same.

And if at the expiration of twenty-four hours after such notice the same be not complied with, the manure, dung, soil, or filth, or matter referred to shall be vested in and be sold or disposed of by the said local board, and the proceeds thereof shall be carried to the district fund account hereinafter mentioned.

THE COMMON LODGING-HOUSES ACT, 1851.

(14 & 15 Vict. c. 28.)

To Enter Lodging-houses.

Section 12.—The keeper of a common lodging-house, and every other person having or acting in the care or management thereof, shall at all times, when required by *any officer of the local authority*, give him free access to such house or any part thereof.

THE TOWNS' IMPROVEMENT CLAUSES ACT, 1847.

(10 & 11 Vict. c. 34.)

Definition of Public Lodging-house.

Section 116.—Every house shall be deemed a public lodg-

ing-house within the meaning of this Act in which persons are harboured or lodged for hire for a single night, or for less than a week at one time, or any part of which is let for any term less than a week.

The Nuisances' Removal Act for England, 1855.

(18 & 19 Vict. c. 121.)

To Enter Private Premises and Examine them.

Section 11.—The local authority shall have power of entry for the following purposes of this Act, and under the following conditions :—

(1) To ground proceedings.

For this purpose, when they or *any of their officers* have reasonable grounds for believing that a nuisance exists on any private premises, demand may be made by them or their officer on any person having custody of the premises of admission to inspect the same at any hour between nine in the morning and six in the evening, and if admission be not granted, any justice having jurisdiction in the place may, on oath made before him of belief in the existence of the nuisance, and after reasonable notice of the intended application to such justice being given in writing to the party on whose premises the nuisance is believed to exist, by order under his hand require the person having the custody of the premises to admit the local authority or their officer; and if no person having custody of the premises can be discovered, any such justice may and shall, on oath made before him of belief in the existence of such nuisance, and of the fact that no person having custody of the premises can be discovered, by order under his hand authorise the local authority or their officers to enter the premises between the hours aforesaid.

(2) To examine premises where nuisances exist, to ascertain the course of drains, and to execute or inspect works ordered by justices to be done under this Act.

Drains.

For these purposes, whenever under the provisions of this

Act a nuisance has been ascertained to exist, or where an order of abatement or prohibition under this Act has been made, or when it becomes necessary to ascertain the course of a drain, the local authority may enter on the premises, by themselves or their officers, between the hours aforesaid, until the nuisance shall have been abated, or the course of the drain shall have been ascertained, or the works ordered to be done shall have been completed, as the case may be.

The Sanitary Act, 1866.
(29 & 30 Vict. c. 90.)

Power to Abate Nuisance.

Section 20.—It shall be the duty of the nuisance authority to make, from time to time, either by *itself or its officers*, inspection of the district, with a view to ascertain what nuisances exist calling for abatement under the powers of the Nuisances' Removal Acts, and to enforce the provisions of the said Acts, in order to cause the abatement thereof, also to enforce the provisions of any Act that may be in force within its district requiring fireplaces and furnaces to consume their own smoke;

And any justice, upon complaint upon oath, may make an order to admit the nuisance authority or their officers, for these purposes, as well as to ground proceedings under the 11th section of the Nuisances' Removal Act, 1855.

The Public Health Act, 1848.
(11 & 12 Vict. c. 63.)

As to Filthy Houses.

Section 60.—And be it enacted that, if upon the certificate of the *officer of health*, if any, or of any two medical practitioners, it appears to the local board of health that any house, or part thereof, is in such a filthy or unwholesome condition that the health of any person is affected or endangered thereby, or that the whitewashing, cleansing, or purifying of any house or part thereof would tend to prevent or check

infectious or contagious disease, the said local board shall give notice in writing to the owner or occupier of such house or part thereof to whitewash, cleanse, or purify the same, as the case may require;

And if the person to whom notice is so given fail to comply therewith within such time as shall be specified in the said notice, he shall be liable to a penalty not exceeding ten shillings for every day during which he continues to make default;

And the said local board may, if they shall think fit, cause such house, building, or part thereof, to be whitewashed, cleansed, or purified, and the expenses incurred by them in so doing shall be repaid by the owner or occupier in default, and be recoverable from either of them in the summary manner hereinafter provided.

Section IV.

SEWAGE EMANATIONS.

Sewage acts injuriously, whether in the gaseous or liquid state, and whether it contaminates the air or the drinking water.

Sewage smell is generally perceptible, and reveals the fact of the escape of sewage gas, as well as the position of it, and will often be found in a kitchen sink, or a waste water-pipe in some part of the house; but not unfrequently it is due to a defective state of the water-closet, either by the fixing being unsound, by the trap being insufficiently filled with water, or by the water in the trap being charged with it.

It is, however, quite possible that an inodorous poisonous gas, as carbonic oxide, may pervade inhabited places, in a proportion far beyond that of foul gas, and thus escape

detection, and be the more dangerous in that its presence is unperceived.

The air in sewers varies greatly in composition, but consists of sulphuretted hydrogen, carburetted hydrogen, ammonium sulphide, nitrogen, oxygen, carbonic acid, ammonia, and certain fœtid gases allied to the compound ammonias. These vary very much in their relative quantities; but sulphuretted hydrogen has been found to the extent of 3 per cent.; carbonic acid, 15·9 per cent.; and light carburetted hydrogen, 88·5 per cent.; whilst the oxygen has been reduced so low as 2 and the nitrogen 5·35 per cent.; but these are extreme quantities. In well-ventilated sewers, the sulphuretted hydrogen has been reduced to a trace, carbonic acid to 0·307 per cent., or even to a less amount, whilst the oxgen may be 20·71 per cent. These quantities are, however, extremes in the other direction.

The presence of the more important gases may be roughly determined in a very ready manner. Thus the sulphuretted hydrogen blackens paper moistened with a solution of acetate of lead, besides having a special and very offensive odour.

Carbonic acid throws down a white deposit with lime-water or baryta-water.

Ammonium sulphide is detected by using a slip of paper dipped in a solution of nitro-prusside of sodium.

Light carburetted hydrogen, or marsh-gas, may be ignited as it escapes in bubbles.

Ammonia is determined, as stated elsewhere, by Nessler's process. A known quantity of the air containing it is drawn through Nessler's test, and the weight of the precipitate is

determined. After this the following formula will determine the quantity :—

559 : 17 : : weight of precipitate : x.

The influence of water mixed with sewage in the production of typhoid fever is believed to be well established, and, when contaminated with the discharges of cholera patients, is believed to be the cause of cholera. In the former case, the poisonous matter, whether specific or otherwise, acts upon Peyer's glands, and tends to produce inflammation, ulceration, and perforation; but in the latter, it is affirmed to be a specific poison, although it has not been isolated and demonstrated, which can be derived only from a patient afflicted with the same disease. Dr. Hüter has recently affirmed that the presence of monads in the blood is the cause of fever by blocking up some of the capillaries, and thus obstructing or arresting the circulation. The introduction of putrid matter gives rise to the monads, and connects fever with defective sanitary arrangements. This is known as the mechanical theory of fever. These should be regarded as theories rather than as proved facts; but they have sufficient weight to demand that the first attention of the medical officer should be directed to them.

Section V.

IMPURE AIR.

The presence of foul air may usually be determined by the sense of smell; but it may also be correctly inferred

from a consideration of the means of ventilation, the cubical capacity of a room, the impediments to air-circulation, and the number of persons occupying the room. Of all the chemical compounds found in such an atmosphere, two require immediate attention, viz. the animal products, and the diminution in the proportional quantity of oxygen as inferred by the amount of carbonic acid present.

ORGANIC NITROGEN.

The former, or the nitrogenous products, are readily ascertained qualitatively, and in a degree quantitatively, by the use of the permanganate of potash test, in the manner arranged by Dr. Angus Smith.

The principle involved in the permanganate test is the decoloration of a solution of known strength by a known quantity of air shaken with it. The test fluid itself must be prepared by a chemist, and may be kept ready for use. By Dr. Smith's most recent process, he uses a larger vessel than formerly, and draws the air through it by means of an aspirator or bellows. He takes about 30 c.c.* of very pure water, and adds a small amount of a known solution of permanganate, after which the air is well shaken, and afterwards extracted by the aspirator, and a new supply obtained. This is repeated "until the whole colour is removed, or a sufficient amount to enable one to test the remainder, so as to be able to estimate the difference."

The strength of the solution is such that experiments prove it to contain 0·00225 gramme† of metallic iron in the

* 462 grains.

† 0·0347 grains of iron in 16·9 minims of water.

cubic centimetre. The test may be practically used in two ways:—First. A known quantity of the solution (mixed with water as already mentioned) may be used, and the experiment is to prove how much of a given specimen of air must be shaken with it before it is decolorised, and the result will be stated in terms of the two quantities. If the solution be placed in a quart bottle (69·318 c.i.), and the contained air does not decolorise the quantity of the solution, a new supply is drawn into and through the bottle, until all the used air has been removed, and whilst the solution is at rest. Again the solution and air are well shaken, and if at length the solution should be decolorised, two quarts (or 138·636 c.i.) of air will have decolorised a certain volume of the permanganate test. By the second mode, a bottle of a given size, say a quart, may be taken, and a certain quantity of the permanganate used (taking care that the quantity shall be very small), and if the colour should have been removed by the contained air, a further quantity of the solution is added until the colour is not entirely removed, and the quantity is then to be recorded. Thus, either the air or the permanganate solution must be a fixed quantity, and the experiment will give the quantity of the other.

This is shown by the following results, as obtained by Dr. Smith.

He used 5 cubic centimetres (77·20 grains) of the permanganate, of which 1 cubic centimetre was equal to 0·00225 of iron, or 0·00032 of oxygen.

(No. 29.)

	Place.	Air passed through Solution.	
		Litres.*	Cubic Feet.
	Air on the hills near Buxton . .	Above 90	Above 3½
1	At the laboratory	64·750	2·286
2	,, ,, ...	61·680	2·178
3	,, ,, ...	61·680	2·178
4	,, ,, ...	67·848	2·396
5	,, ,, ...	66·306	2·341
6	,, ,, ...	64·750	2·286
7	,, ,, ...	64·750	2·286
8	,, ,, ...	66·306	2·341
9	,, ,, ...	67·848	2·396
10	,, ,, ...	65·521	2·313
	Mean at Manchester . . .	65·143	2·300
1st	In the lead chamber after three persons had remained about two hours .	46·260	1·633
2nd	Ditto	49·344	1·742
3rd	Ditto	43·176	1·524
	Mean	46·260	1·633
	Human breath	44·718	1·579
	,, ,, ...	47·802	1·688
	Mean	46·260	1·633
	Air from a midden	52·428	1·851
	,, ,, ...	57·054	2·014
	,, ,, ...	47·402	1·674
	Mean	52·294	1·846
	In lead chamber with vapour of gunpowder	43·176	1·524

* A litre is equal to 1·760 pint.

Again he used a fixed quantity of air, 37·5 litres (66 pints), of air tested with weak permanganate, with the following results :—

(No. 30.)

AIR-WASHINGS OF 37·5 LITRES OF AIR (THE AMOUNT USED FOR AN EXPERIMENT) TESTED WITH WEAK PERMANGANATE.

Place.	Date, 1870.	Milligrammes.* Oxygen required by Washings of 37·5 Litres of Air.	
		Instantly.	Total in a few Minutes.
York Place . .	January 21 .	0·0060	0·0116
Front of laboratory .	,, 24 .	0·0238	0·0411
,, ,, ,, .	,, 27, misty	0·0195	0·0416
Yard behind ,, .	,, 20 ,,	0·0210	0·0453
,, ,, ,, .	,, 27 ,,	0·0563	0·0779
A water-closet . .	,, 26 ,,	0·0061	0·0195
A privy . . .	,, 23 .	0·0423	0·0747

* 1 milligramme equals 0·01543 grain.

The following results were obtained by a fixed and equal quantity of air, and the quantity of the solution which was decolorised shows the relative net absolute quantity of organic or oxidisable matter in the air :—

(No. 31.)

GRAINS OF SOLUTION OF PERMANGANATE OF POTASH, DECOMPOSED BY EQUAL QUANTITIES OF AIR. THE LAST COLUMN GIVES THE COMPARATIVE AMOUNT OF OXIDISABLE MATTER IN THE AIR.*

Place.	Date, 1858.	Temperature.	Grains of Solution of Permanganate used.
London:		Fahr.	
Wellington Street	July 13	70°	45
,, ,, higher up	,,	,,	25
Waterloo Steps	,,	,,	42
Blackfriars, in the street	,,	,,	25
Southwark Bridge (at river)	,,	,,	55
Street near the same bridge	,,	,,	22
A little distance from river	,,	,,	22
Street near Fetter Lane	,,	,,	30
Fenchurch Street Station	,,	77°	18
Loughton (in Epping Forest, on the hill)	,,	,,	16
,, inside a house	,,	69°	18
Camden Square	,,	72°	26
,, ,,	,,	,,	26
Sixty miles from Yarmouth, at sea	Aug. 1	69·5°	3·5
Hospice St. Bernard, in a mist	. .	. .	2·8
Lake Lucerne, in middle-evening	. .	. .	1·4

AMMONIA.

Ammonia is present in the air almost universally, and particularly where there are decomposing animal and vegetable matters, as manure. It is recognised in two forms, viz. as ammonia, and as organic or albumenoid ammonia, in precisely the same manner as in water. The process of Nessler for free ammonia and that of Wanklyn, as already

* This comparative amount having been mistaken for an actual amount, I must call attention to the fact that no actual quantity is attempted to be given in the table.

described in the section on impure water, for albumenoid ammonia, are required for the examination of air.

The following results of experiments are extracted from the tables published by Dr. Angus Smith:—

(No. 32.)

			Ammonia free or with Acids	Organic or Albumenoid Ammonia.
Manchester.			Grains per million cub. ft. of Air.	Grains per million cub. ft. of Air.
Laboratory and yard, and street adjoining	1869 and 1870	average	53·582	116·544
Bedroom		,,	44·305	104·118
Midden		,,	146·911	181·524
London.				
Chelsea	Nov. 4	,,	19·936	48·180
Hyde Park	,, 5	,,	12·655	37·965
Woburn Square and off Regent Street	,, 11	,,	16·614	58·148
Islington, Hoxton, Dalston, and Hackney	Nov. 8	,,	26·701	65·286
Bethnal Green and Stepney	,, 9	,,	41·534	83·086
London Bridge	,, 10	,,	27·419	61·166
Embankment of Parliament Houses	,, 13	,,	21·119	71·805
Back street near Lambeth Workhouse	,, 10	,,	88·700	105·595
Near Vauxhall Bridge	,, 6	,,	16·614	66·455
Average of many places in and about London			26·780	65·947
Underground Railway, November		average	31·561	163·167
Glasgow, February and March		,,	34·169	—
Shore—Muellan, Frith of Clyde, March		,,	22·845	—

CARBONIC ACID.

The quantity of oxygen cannot be determined directly in any ready or off-hand manner, but it may be inferred inversely from the amount of carbonic acid gas which is

present, for whatever may be the action of the latter, its presence proves that there is a diminished quantity of oxygen.

The presence of carbonic acid is very readily determined by shaking the air with lime-water or baryta-water, when the solution becomes cloudy; and the quantity may also be readily ascertained by weighing the deposit; but a more simple plan has been arranged by Dr. Angus Smith, after Pettenkofer, on the volumetric system.

Thus he finds that by taking a fixed quantity of lime-water, and varying the capacity of the bottle in which it is placed (and therefore the quantity of air used), he can very closely determine the proportion of carbonic acid in the contained air. The bottle used by him is of sufficient size at the top to admit the hand for the purpose of cleansing, and he draws air through the bottle with a flexible bellows pump until the contained air represents that which is to be analysed. Taking half an ounce of lime-water as the standard quantity, he has constructed the following table :—

(No. 33.)

DETERMINATION OF CARBONIC ACID.

Carbonic Acid. Per Cent.	Size of Bottle.
0·03	without precipitate in 20·63 oz. avoirdupois.
0·04	,, ,, 15·60 ,,
0·05	,, ,, 12·58 ,,
0·06	,, ,, 10·57* ,,
0·07	,, ,, 9·13 ,,
0·08	,, ,, 8·05 ,,
0·09	,, ,, 7·21 ,,
0·10	,, ,, 6·54 ,,

* This is the most useful test bottle in analysing the air of dwellings, as the quantity of carbonic acid is quite within the range of healthy air-feeding.

Carbonic Acid. Per Cent.			Size of Bottle.	
0·15	without precipitate	in	4·53	oz. avoirdupois.
0·20	,,	,,	3·52	,,
0·25	,,	,,	2·92	,,
0·30	,,	,,	2·51	,,
0·50	,,	,,	1·71	,,
1·00	,,	,,	1·10	,,

The air must be well shaken with the water, and no precipitate will occur unless the quantity of carbonic acid be greater than that which is placed opposite to the capacity of the bottle.

The capacity of various bottles will be readily ascertained by the fact that an imperial pint equals 20 oz. or 34·659 c.i., and consequently that 1 fluid ounce equals 1·7329 c.i.

The relative importance of organic matter and carbonic acid in the atmosphere may be inferred from the following remarks of Dr. Smith :—

I am able to state that an atmosphere containing 0·19 per cent. of pure carbonic acid feels very agreeable, and cannot, at least in half an hour, be distinguished from pure air. This was found at Messrs. Jewsbury and Brown's (soda-water manufactory), Manchester. The windows were wide open, and fresh air was coming in, but the amount of gas escaping was enough to keep the lowest amount of carbonic acid at 0·1 per cent., whilst the bottlers breathed at least 0·19 per cent., but generally much more. The place was fresh and agreeable. The fact I consider as sufficient to enable us to throw on the organic matter all the first blame of the discomfort in badly ventilated rooms. So pleasant was the air in the manufactory that very much more carbonic acid could have been borne. It was not apparent to the senses; indeed, it will be seen that 4 per cent. was not very evident to the senses, although it affected the vitality; whilst we thus throw on the organic matter the sensible discomfort of the time, we are not yet able to say that 0·19 per cent. of carbonic acid caused no physiological effect. That point is for

the present reserved. The absence of an effect which the sense of smell could detect did not hinder a very remarkable lowering of the pulse where air containing 4 per cent. of carbonic acid was breathed.

In further elucidation of this subject it may be useful to show the actual amount of carbonic acid and of oxygen in numerous places, and under different conditions.

Dr. Angus Smith found the carbonic acid in air as follows:—

(No. 34.)

	Carbonic Acid. Volume per Cent.
On hills in Scotland, from 1000 to 4000 feet high	0·0332
At the bottom of those hills	0·0341
On hills of various elevations from 1000 to 3000 feet,	0·0332 to 0·0337
Frankland found on the Grands Mulets	0·011
,, ,, summit of Mont Blanc	0·061
,, ,, Chamounix	0·063
Saussure found on Lake of Geneva . . . . mean	0·0439
,, ,, at Chambeisy . . . . ,,	0·0460
Da Luna found at Madrid . . . . ,,	0·0501
Pettenkofer found in the air in and around Munich	0·05

The quantity of this gas is sometimes very greatly increased. Thus, according to the same authority:—

(No. 35.)

In Manchester streets	0·0403
,, ,, during fog	0·0679
About middens	0·0774
In workshops, down to	0·3000
In theatres, worst part of	0·3200
In mines, average of 339 analysis	0·7850
,, extreme amount found in worst	2·5000

The following results have been collected by Dr. Parkes:—

(No. 36.)

	Carbonic Acid. Volume per Cent.
Barrack (unventilated) in London (Roscoe)	0·1242
,, in Chatham (Fyffe)	0·195
Military Hospital, Chatham (Fort Pitt) maximum	0·180
Barracks at Aldershot ,,	0·140
Barrack-hut, Hilsea ,,	0·1214
General Hospital, Madrid ,,	0·43
Boys' School (Roscoe), bad ventilation	0·2371
,, ,, ,,	0·3100
Crowded meeting (Roscoe)	0·365
Sleeping-room in Salpêtrière	0·500
,, in Madrid (Da Luna)	0·480
School-room (Pettenkofer)	0·723

In analyses of the air of many printing-offices in London which I made for the Privy Council in 1863 (*Sixth Report of the Medical Officer of the Privy Council*), the following results were obtained:—

(No. 37.)

Period of the Day.	Carbonic Acid. Grains in 100 Cubic Feet.
Day to 6¾ P.M.	0·084
Night to 1 A.M.	0·0502
Day	0·044
Night to midnight	0·097
Evening to 8 P.M.	0·294
Night to 12½ A.M.	0·060
Day to 3 P.M.	0·048
Night	0·100
Evening to 8 P.M.	0·056
Night to 1 A.M.	0·051
Evening to 9 P.M.	0·080

OXYGEN.

The proportion of oxygen in good or moderately good air is as follows:—

(No. 38.)

	Oxygen. Per Cent.
Gay-Lussac and Humboldt, from many experiments, found that it varied from 20·9 to 21·2 per cent. . mean	21·0
Gay-Lussac, in the air from mountains and from fens . ,,	21·49
De Saussure, in the air from Chambeisy, found variations from 20·98 to 21·15 . . . . . ,,	21·05
Berthollet	21·05
Thom. Thunson	21·0
Davy	21·0
Vogel, on the Baltic	21·59
Hermbstädt, on the Baltic	21·59
Dalton, at Manchester, variations from 20·7 to 21·15 . mean	20·87
Regnault, in the air of Paris . . . . . ,,	20·96
,, ,, ,, ...	20·913 to 20·999
,, ,, Lyons and around . .	20·918 ,, 20·966
,, ,, Berlin	20·908 ,, 20·998
,, ,, Madrid	20·916 ,, 20·982
,, ,, Geneva and Switzerland .	20·909 ,, 20·993
,, ,, Toulon and Mediterranean	20·912 ,, 20·982
,, ,, Atlantic Ocean . .	20·918 ,, 20·965
,, ,, Ecuador	20·960
,, ,, higher than Mont Blanc .	20·949 to 20·981
Bunsen, at Heidelberg . . . . average	20·924 ,, 20·840
Graham	20·9
Liebig	20·9
R. Angus Smith, sea-shore, Scotland	20·9990
,, tops of hills, Scotland	20·9800
,, suburbs of Manchester . .	20·9470 and 20·9800
,, St. John's, Antigua	20·9500
,, London, open places, summer . .	20·9500
Frankland, air from Chamounix	20·804
,, ,, top of Mont Blanc	20·963
,, ,, Grands Mulets	20·802
Brunner—Faulhorn	20·91
Berger—Jura and other mountains	20·3 to 21·63
Miller, from balloon ascent, 18,000 feet high . . .	20·88
,, ,, ,, near the earth . . .	20·92
Angus Smith—London, N., N.E. and N.W. districts average	20·857
,, ,, S. and S.W. ,, . ,,	20·883

		Oxygen. Per Cent.
Angus Smith—London, E. and E.C. districts	average	20·86
,, ,, W.C. and W. ,,	,,	20·925
,, ,, N.W., S., S.W. and W., park, &c.	,,	20·95
,, Mountains of Scotland, top	mean	20·98
,, ,, ,, bottom	,,	20·94
,, Many parts of Scotland	,,	20·96
,, Worst parts of Perth	,,	20·935
,, Workhouse wards, London	20·88 to	20·93
,, ,, four best wards	day average	20·92
,, ,, ,, ,,	midnight ,,	20·881
,, ,, ,, ,,	morning ,,	20·880

In some positions in which men still breathe and live, the quantity of oxygen is reduced about 4 per cent.

(No. 39.)

	Oxygen. Volume per Cent.
Dr. R. Angus Smith—In mines: air from parts very difficult to remain in many minutes	17·2000
,, In mines: the worst specimen yet examined	18·2700
,, In mines: when candles go out	18·5000
,, ,, in sumps or pits	20·1400
,, ,, under-shaft of metalliferous mines. average	20·4240
,, Court of Queen's Bench, Feb. 2, 1866	20·6500
,, Mines, large cavities in. average	20·7700
,, About backs of houses and closets in London	20·7000
,, Pit of theatre, 11·30 P.M.	20·7400
,, Gallery ,, 10·30 P.M.	20·8600
,, Sitting-room which felt close, but not excessively so	20·8900
,, Tunnel on Metropolitan Railway	20·60
Frankland—Air in laboratory of Owens College, November and December. mean	20·872
Regnault—Air at Toulon harbour	20·85
,, ,, Algiers	20·42
,, ,, Bengal Bay	20·46

		Oxygen. Volume per Cent.
Leblanc—	Close stable, École militaire	20·39
,,	Salle d'Asyle, with 116 children	20·53
,,	Salle d'École primaire	20·65
,,	Sleeping-room at the Salpêtrière	20·36
,,	Another	20·44
,,	Chemical theatre at the Sorbonne	20·28
,,	Bed-room in the new wing	20·74
Da Luna—	Air of Madrid, outside the walls, average	20·75
,,	,, inside the walls, ,,	20·74
,,	In hospitals	20·55

COAL GAS PRODUCTS.

A not unfrequent source of contamination of the air of rooms in towns is the escape of coal gas or the presence of the products of gas combustion. The former occurs much more frequently than is appreciated from defective gas-fittings, which allow escape at the joints, deficiency of water trapping in the telescope chandelier, and negligence in leaving some burners open when the supply is cut off at the meter. The smell of the gas reveals its presence when in a considerable quantity, but, when in small quantity, it closely resembles that of sewage.

The products of the combustion of gas are carbonic acid, carbonic oxide, compounds of ammonias, and various compounds of sulphur, which are clearly injurious to health. As provision for the removal of them by special means is most rare, they accumulate in the room, and are again and again respired, causing not unfrequently headache and irritation of the mucous membrane of the bronchi and eyes. They are particularly injurious to asthmatical persons.

Coal gas, when fairly purified, is composed of (Parkes) :—

(No. 40.)

	Per Cent.		
Hydrogen	40	to	45·58
Marsh-gas	35	,,	40
Carbonic oxide	3	,,	3·6
Olefiant gas (ethylene)	3	,,	4
Acetylene	2	,,	3
Nitrogen	2	,,	2·5
Carbonic acid	3	,,	3·75
Sulphuretted hydrogen	0·29	,,	1
Sulphurous acid, Ammonia or ammonium sulphide, Carbon bisulphide	0·5	,,	1

When less perfectly purified, the sulphur has amounted to 60 grains in 100 cubic feet, which is thrice the maximum allowed by Act of Parliament; carbonic oxide, 11 per cent.; marsh-gas, 56 per cent.; besides a great number of hydrocarbons and alcohols and other chemical compounds in small amount.

The products of combustion vary much with the quality of the gas and the completeness of the process, but 100 cubic feet will unite with from 90 to 164 cubic feet of oxygen, and produce 200 cubic feet of carbonic acid and from 20 to 50 grains of sulphuric acid, so that 100 cubic feet of coal gas consume the oxygen or destroy the vital qualities of 800 cubic feet of air, and raise the temperature of 31·290 cubic feet of air 100° Fahr.

With imperfect combustion, 67 per cent. of nitrogen, 16 per cent. of water, 7 per cent. of carbonic acid, and 5 to 6 per cent. of carbonic oxide, with sulphurous acid and ammonia, are thrown into the atmosphere, but the quantity of carbonic acid will be materially reduced with more perfect combustion.

Only a very imperfect appreciation of the effect of gas-lighting on the air respired at present exists, but if the

products above mentioned are allowed to escape into the room, whilst at the same time the air is thus robbed of its oxygen, the slightest reflection will suffice to show how unfit such air must be for the respiration of man. Such is almost invariably the practice, but it is possible by the use of ventilating gaseliers to remove all the products from the room, and to supply pure air at the same time.

FLOATING PARTICLES.

The floating particles in the atmosphere may be readily collected by the aid of cotton wool placed in a glass tube, and air aspired through it, and, when collected, may be examined with the microscope. Dr. Smith found a great variety of substances, animal, vegetable, and mineral, but it does not thence follow that they were the causes of particular diseases. Such an enquiry should, however, have the germ-theory of disease in view, in order to add to our knowledge, if not to find the immediate cause, of disease. This has, in some degree, been advanced by the theory that scarlet-fever is transmitted by the detached scarf-skin, which may be inhaled or otherwise brought into contact with the body and convey the disease to others.

Dr. Angus Smith found various organisms in crowded rooms with vitiated air. Thus he writes:—

> I mentioned some time ago that I had got a quantity of organic matter from the windows of a crowded room, and I have since frequently repeated the experiment. This matter condenses on the glass and walls in cold weather, and may be taken up by means of a pipette. If allowed to stand some time, it forms a thick, apparently glutinous mass; but when this is examined by a microscope, it is seen to be a clearly marked confervoid growth.

SECTION VI.

METEOROLOGICAL AND SEASONAL INFLUENCES.*

Nothing is better established than the fact that the mortality from various diseases varies with meteorological and seasonal conditions, and that at certain periods one class of diseases may be expected to prevail, and at other periods other diseases. So certain is this relationship that an excess of the seasonal conditions, whether of heat in summer or of cold in winter, increases the mortality, while a mild season as it is called, viz. a cool summer and a warm winter, is attended by a diminution in the deaths due to seasonal influences.

This influence is not restricted to this country or to our own day, but has existed in all countries and ages, and is as clearly admitted in the writings of the ancients as in the mere matter-of-fact reports of our Registrar-General.

I propose on this subject to extract some remarks from my work on cyclical or periodical influences,† which will sufficiently illustrate the subject.

STATEMENTS OF THE ANCIENTS.

255. It is almost impossible to turn over the pages of the medical fathers without finding how much importance was attached to season in the production and cure of disease, or without admitting that the information which they have handed down to us is true and applicable to our own era. We do not purpose to enter at any length into the history of this department of knowledge; but we think that it will be

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* See also "Climate," page 72.

† *Health and Disease: Periodical Changes in the Human System;* King & Co., Cornhill.

instructive to notice with what extent and accuracy the influence of season was known to Hippocrates, as is shown in the twenty-four *Aphorisms* which he has transmitted, and which have been so ably edited for us by Sprengel,* Adams, and Clifton.

256. The division of the seasons has varied with different nations and eras, and has been arbitrary, except so far as it was associated with the occurrence of certain natural phenomena more or less general or peculiar to the locality. We find that in the most ancient periods the Egyptians† divided the year into three seasons, viz. the "Season of Vegetation," the "Season of Manifestation," and the "Season of the Waters," or the "Inundation;" and at the present time the first is called "Winter," the second "Summer," and the third "Inundation," or literally "The Nile." This division was associated with terrestrial changes; but in ancient Greece it was determined by astronomical phenomena, as it is with us at the present day.

257. Dr. Adams informs us that with the ancients *Winter* began at the setting of the Pleiades, viz. the period when they set with the sun, and continued to the vernal equinox. *Spring* commenced at the last-mentioned period (the vernal equinox), and ended at the rising of the Pleiades, viz. the rising with the sun. *Summer* began at the rising of the Pleiades, and continued to the rising of Arcturus; and *Autumn* extended from the rising of Arcturus to the setting of the Pleiades. Thus the division of the seasons was purely astronomical, and the constellations of the Pleiades and Orion were the dividing objects; the rising of the Pleiades with the sun separating the first from the second half of the year, and the setting of the same constellation with the sun terminating the year.

258. Having thus defined the several seasons, we will now, in a few words, give a condensed account of their influence as gathered from the opinions of Hippocrates, expressed in the *Aphorisms* above mentioned.

259. Change of seasons and the alternations of cold and heat in those seasons are most effectual causes of diseases.

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* *Aphorisms of Hippocrates*, by Dr. Sprengel; London, 1708.
† *Horæ Egyptiacæ*, 1851.

Some natures are well or ill affected in summer, and some in winter. Some diseases and some ages are well or ill affected at different times of the year, &c.

260. Autumnal diseases may be reasonably expected when on the same day it is sometimes hot and sometimes cold. The south wind dulls the senses of hearing and sight, causes headache, heaviness, and faintness. When it prevails, these incidents occur to the weak and sickly. The north wind affects the chest and throat, and causes constipation, dysuria, and muscular pains. The south wind relaxes and the north wind contracts the tissues of the body. When the summer is like the spring (viz. cool and wet), we must expect much sweating in fevers. Dry seasons are the cause of sharp fevers.

261. Constant and seasonable times of the year are accompanied by diseases which are regular and mild, but in inconstant and unseasonable times the diseases are uncertain and difficult of cure.

262. In autumn diseases are most acute and pernicious, and that season is hurtful to those in consumption. Spring is most healthy and free from fatal disease. If the spring be rainy with southerly winds, and have followed a dry and cold winter, there will be in the following summer acute fevers, catarrhs, and bloody discharges. With a dry and northerly spring, following a rainy and warm winter, there will be bloody discharges, ophthalmia, rheumatism, and catarrhs, fatal to old people. Abortions easily arise under these conditions, and children thus born near the spring are weak and diseased, and either grow up so or die quickly. A rainy and warm (southerly) autumn, following a dry and cold (northerly) summer, will produce in the winter pains in the head, cough, catarrhs, and consumption. A dry and cool (northerly) autumn is good for those of a moist temperament, but to others it produces ophthalmia, acute and lingering fevers, and melancholy.

263. Great droughts are more wholesome and less destructive than continual rains and frequent showers. Continual rains cause most diseases, as lingering fevers, diarrhœa, diseased humours, falling sickness, and apoplexy. Great droughts occasion consumption, inflammation of the eyes, rheumatism, incontinence of the urine, and bloody discharges.

264. Continued northerly weather braces and strengthens

the body, makes it agile, fresh-coloured, and quick of hearing. It restrains the bowels, increases chest-pains, and offends the eyes. Southerly seasons relax and moisten the body, dull the senses of hearing and sight, cause heaviness, vertigo, laziness, and diarrhœa.

265. Children and very young people have good health in the spring and the beginning of summer; old people in summer and some part of autumn; people of middle age in autumn and winter.

266. All diseases appear at all seasons, but some are caused and exasperated rather in one than another. In the spring affections of the brain, falling sickness, discharges of blood, affections of the throat and chest, diseases of the skin, and rheumatism. In summer some of the above; also burning fevers, agues, disorders of the stomach and bowels, violent sweatings, and affections of the eyes, ears, and mouth. In autumn many summer diseases, also fevers, enlargement of the spleen, dropsies, consumption, asthma, diarrhœa, and dysentery; Iliac passion, falling sickness, and brain diseases.

PRESENT LIABILITY TO DISEASE.

377. The existence of seasonal disease is well established, for from the era of Hippocrates to our day the experience of mankind has borne testimony to the variations in the prevalence of disease at various seasons of the year, and to the fact that the same kind of disease assumes a different aspect at various seasons; or, to speak more generally, in various years. We need only refer to the occurrence of the plague in London in 1593, 1603, 1625, 1636, and 1665,* all of which received their vast development in the hot season, and to the general manifestation of cholera in our day at the same periods. The occurrence of yellow fever at the end of summer in southern climes, the prevalence of special eruptive maladies at different seasons, and the occurrence of inflammatory diseases in the cold season, are familiar illustrations of universal belief upon this subject; but as we shall hereafter give details upon this question, we shall not now discuss it further.

* *Report on Cholera* (Dr. Farr), p. clxxiii.

378. *The foundation of seasonal disease is the varying degree of vital action proceeding within the body at the different seasons of the year.*

379. We must admit that disease is in its principal forms an exaggeration of a natural tendency then existing in the human body—a tendency which only becomes disease when carried beyond a certain limit. Thus we find that a person of feeble habit is especially liable to disease in which exhaustion is a prominent feature, and one of plethoric habit is unusually exposed to congestive and inflammatory diseases.

380. We have already shown that the human system varies in its amount of vital action in a very definitive manner, the maximum being in the spring, the decline and the minimum in the summer, the minimum and the increase in the autumn, and a stationary elevation in the winter. Just in the like order is it exposed to an exaggeration of these tendencies. Thus as a rule the diseases of the end of summer are those of exhaustion, whilst those of winter and spring are known as inflammations, and those of autumn and the end of spring are marked by such conditions as result from rapid variation in the animal economy in its relation to the influence of external agents. There is also a variation in the type of disease according to the advancing tendency of the system, so that in the later part of spring, when there is the commencement of a downward tendency of the vital actions, the progressive attacks of the diseases will progressively show an asthenic type, until they at length terminate in the diseases of exhaustion infesting the summer season; whilst, on the other hand, diseases occurring at the end of summer and the early autumn progressively change their aspect from the asthenic form until they merge into the sthenic conditions of winter.

381. Hence there are both settled sthenic and asthenic conditions, and conditions varying in a definite direction between them, and as they are due to the amount of vital action existing (which results from the influence of the agencies which constitute the season) so will the sthenic or asthenic character be manifested at their respective seasons. With this key, therefore, we may not only foretell the character of disease at a given period of the year, but may also be acquainted with the variations in the type of

the same disease, as manifestations of it may from time to time occur with the progression of the seasons. Thus, for example, an attack of scarlatina occurring at the end of a hot summer and with a warm and moist autumn must manifest a distinctly adynamic type, whilst if it occur after the cold weather has set in, or during a cold summer, it will be more and more inflammatory until the system is no longer very liable to that form of disease.

382. *There are diseases which result from an arrest or lessening of the natural tendencies of the system.*

383. Such is the character of disease which is induced by an excess of seasonal influences or in a system unusually sensitive to the ordinary degrees of seasonal influence, viz. one of exaggeration of the natural tendencies of the system; but there are other diseases arising from a contrary condition. Thus if when the temperature is increasing, and the skin is required to be unusually active, so as to produce great dispersion of heat, some condition occurs which leads to the arrest of, or a serious diminution in, the action of the skin, the natural tendency of the system is thwarted, and the only condition compatible with health being for the time set aside, a state of disease immediately ensues. This is familiarly illustrated by a cold, the ordinary effect of undue exposure of a part of the body to a lower temperature, and also by the indulgence in such articles of food as tend to lessen the action of the skin. Or again, if during the winter, when the action of the skin and the sensibility of the surface should be much reduced so as to prevent an undue waste of heat, and to pass unheeded the influence of cold, a condition be imparted which tends to maintain the skin in the normal activity of summer—as for example the occupation of highly heated apartments, or the constant use of the Turkish bath—the body will be liable to the effects of too great dispersion of heat, and will certainly be more sensitive to the influence of external cold. Or finally, if with the necessity for high vital action in the winter and spring there should be deficient nutriment supplied, there will be an arrest of that condition which is natural to the body at that period of the year.

384. All this latter class of causes may be regarded as adventitious or accidental, and they act by arresting the

natural order of the phenomena within the system; whilst the former are, so to speak, natural—for the most part flowing from natural causes—and act by adding force to the natural order of phenomena. Both are connected with season, but the latter alone can be truly regarded as seasonal, and subject to the law of cyclical change which we are now discussing.

385. *The constitutional peculiarities of individuals modify the effects of season.*

386. The relation of these internal changes has already been demonstrated, but it may be well to show yet more clearly that there is a constant antagonism proceeding between those external influences and the vital actions of the system; and although the influence of the external agents will in the end draw the vital changes of the body in their train, there is not an uniform readiness to submit to their controlling power. This is commonly referred to the constitution of the individual, so that it is said that such an one "suffers much from hot weather," or he "bears hot or cold weather well," according to the peculiar tendencies of his system to aid or resist the influence of external agencies. The former illustration has been abundantly exemplified in two investigations which have been already referred to. In that conducted at the Brompton Hospital on 15 cases of phthisis, during the increasing temperature of the month of June, there was found to be great variation in the effects of the season in the different cases, and it was ascertained beyond a doubt that those who knew from experience that they bore heat badly had an excess of all the seasonal effects. So, in like manner, when determining the amount of carbonic acid evolved daily during the year, Mr. Moul, who suffers much from heat, showed a much greater diminution in the amount of carbonic acid evolved under the influence of temperature than we evinced who bear heat well—his diminution being, as already stated, 27 per cent. at the middle of June, whilst ours was but little more than that amount at the end of August.

387. In this, no doubt, lies the explanation of the selection of a few victims when many persons are exposed to the same morbid conditions, for it is well known that, although there may be an epidemic of influenza or an outbreak of

cholera which may extend over a great city, only a small proportion of the population thus exposed will be seized by it. It has always been difficult to explain this fact, and hence many theories have arisen referring to the accumulation and the transmission of the morbid influence, each of which may have some weight, but no one has been shown to exert so general a power as to be regarded as an adequate cause of this diversity. Now, however, it having been proved that morbid influences arise under certain external conditions which, whilst they lead to variations in the vital powers of the system, have greater influence upon certain individuals than upon others, we have a ready and general explanation of the selection of such persons as the earliest victims. But, with this truth admitted, we may still need increased information as to the origin and transmission of the morbid influence, as well as to the mode by which those external agencies act which both engender these morbid agents and prepare the system for the reception of their influence.

388. *The dangers to be apprehended in the progress of disease vary with the season.*

389. In the maximum and minimum conditions of the system we find that causes have been long acting, and have gained power by continuance, and hence *the dangers will increase as the season progresses.* This we shall show to be the case in a remarkable degree in the summer season, as manifested by the progress of cholera, and in the winter season by the progress of bronchitis.

390. In the season of change the danger lies in the difficulty of adapting the body with its numerous functions to a new order of external phenomena, and hence *the danger will be the greatest at the commencement of the period of change*, and this may be well illustrated by the early severity and special cause of death from eruptive diseases at the two periods of change.

391. *The frequency of certain diseases has a relation to the season and to the nature of the disease.*

392. We have affirmed that the diseases of the hot weather show an adynamic and those of the cold weather a dynamic type, whilst the characteristic of the spring and autumn months is that of change; and we now purpose to show

that such is the actual nature of the diseases which prevail at those periods.

393. For this purpose we have analysed the London returns of the Registrar-General for the five non-epidemic years of 1850 to 1854, both inclusive, and have ascertained the amount of mortality which occurred from each disease in each quarter of the several years. When these results are compared with the mortality which would have occurred had the deaths been uniformly distributed over the year, we at once perceive the periods of excess or defect, and it is upon that principle that the following table has been compiled.

(No. 41.)

TABLE SHOWING THE EXCESS OR DEFECT IN THE PREVALENCE OF CERTAIN DISEASES AT EACH SEASON OF THE YEAR FROM THE AMOUNT WHICH WOULD HAVE OCCURRED HAD THE MORTALITY BEEN EQUALLY DISTRIBUTED THROUGH THE YEAR.

Disease.	Vital Changes.			
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
	Maximum.	Maximum and Decreasing.	Decreasing and Minimum.	Minimum and Increasing.
Diarrhœa. . .	− 15·2	− 14·5	+ 36·4	− 6·9
Enteritis . .	− 1·7	+ 2·9	+ 4·0	+ 0·2
Gastritis . .	− 2·4	+ 1·4	+ 4·4	− 4·6
Nephritis. . .	+ 2·3	− 0·5	+ 3·4	− 0·8
Peritonitis . .	+ 0·7	+ 4·6	− 4·1	− 1·4
Pleuritis . .	+ 5·0	+ 5·0	− 6·2	− 0·3
Bronchitis . .	+ 12·9	− 1·9	− 14·0	+ 2·8
Pneumonia . .	+ 4·8	+ 1·1	− 10·7	+ 6·7
Pericarditis . .	+ 4·5	+ 0·3	− 6·4	+ 1·5
Cephalitis . .	+ 1·6	+ 0·5		− 2·3
Convulsion . .	+ 2·7	− 0·6	− 2·1	− 0·2
Apoplexy. . .	+ 2·6	− 1·7	− 2·1	+ 1·2
Epilepsy . . .	+ 2·4	− 3·7	− 2·3	+ 3·0
Smallpox . . .	+ 1·0	+ 1·4	− 4·0	+ 1·3
Measles . . .	− 1·1	+ 6·4	− 5·8	− 0·1
Scarlatina . .	− 8·3	− 4·6	− 0·2	+ 12·5
Typhus . . .	− 2·1	− 2·0	+ 0·5	+ 4·2

394. It is manifest that there are inconveniences in the

construction of this table, for as we have shown that certain months exhibit changes of far greater magnitude than others which are comprehended in the same quarter, the full effect cannot be shown when all are added together. This is particularly the case in the second quarter, for whilst April and May are maximum months, June is a month of marked decline. Such diseases, therefore, as depend upon a diminution in the vital powers will scarcely exhibit this characteristic when compared with the conditions of the previous maximum periods. Hence it would have been better for our purpose if the mortality from each disease could have been recorded in each month separately, but the publications of the Registrar-General do not give the required data.

395. Again, the mortality is not sufficient evidence of the prevalence of a disease, for whilst it embraces the question of frequency, as well as that of intensity, the former is necessarily subordinate to the latter, but here also published data fail us, and we are compelled to be content with a knowledge of the mortality alone.

396. All these circumstances militate against the full development of the results which we seek; and whilst the latter are very decided in the foregoing table, it may be inferred that their value is greater than the treble power.

397. *Diseases of the alimentary canal have their maximum intensity and frequency at the period of minimum vitality.*

398. Diarrhœa is the most marked illustration of this fact, for whilst there is a defect in each of the three other quarters, there is an excess of no less than 36 per cent. in the quarter of minimum vitality, and the extremes are so great as a defect of 15 per cent. in the maximum, and an excess of 36 per cent. in the minimum quarter. These numbers are so decided that for all practical purposes diarrhœa may be regarded as a disease solely of the minimum period of vitality; and when it occurs at other periods, we may readily believe that it is due to fortuitous circumstances, or occurs in a state of system which in an unusual degree evinces the characters of the human system in general at the minimum period of vitality. Cholera, in its various outbreaks in England, has followed a similar progression, and has proved itself to be essentially a disease of the minimum period of vitality.

399. The following table shows this fact in a striking manner in the two outbreaks of 1832 and 1849 by the percentage of deaths which occurred in England in the months of May, June, July, August, September, October, and November.

(No. 42.)

TABLE SHOWING THE MONTHLY PROPORTION PER CENT. OF ALL THE DEATHS FROM CHOLERA IN 1832 AND 1849.

	1832. Per Cent.	1849. Per Cent.
May	2·41	0·60
June	4·40	3·76
July	13·57	13·91
August	28·69	29·17
September . . .	17·71	37·46
October	13·19	8·55
November . . .	2·59	1·55

400. There was thus a progressive increase in the mortality from cholera through June and July to the maximum mortality in August in 1832, and through June, July, and August to the maximum in September 1849, and thenceforward in both years there was a rapid decline. These facts show a great preponderance of mortality in the two months when the vital actions were at the minimum.

401. It is interesting to notice that the month of maximum mortality from cholera was earlier in Paris than in this country, viz. in June in 1849, and even in April in 1832, but there is so great a want of uniformity in the progression of the monthly returns from that city that we are tempted to doubt if the records have been well kept, or if the features of this disease were the same in Paris as in London. It is, however, highly probable that a disease which is so closely connected with the degree of vital power of the body will exhibit different manifestations in different countries and climates, for the human constitution certainly differs in its power in various parts of the world, and hence will vary in its capability to resist morbid agencies.

402. Enteritis and gastritis produced their maximum of

mortality in the second and third, or decreasing and minimum, quarters, whilst there was a defect on the average in both diseases in the maximum period of vitality, and in gastritis the defect was continued even into the increasing period.

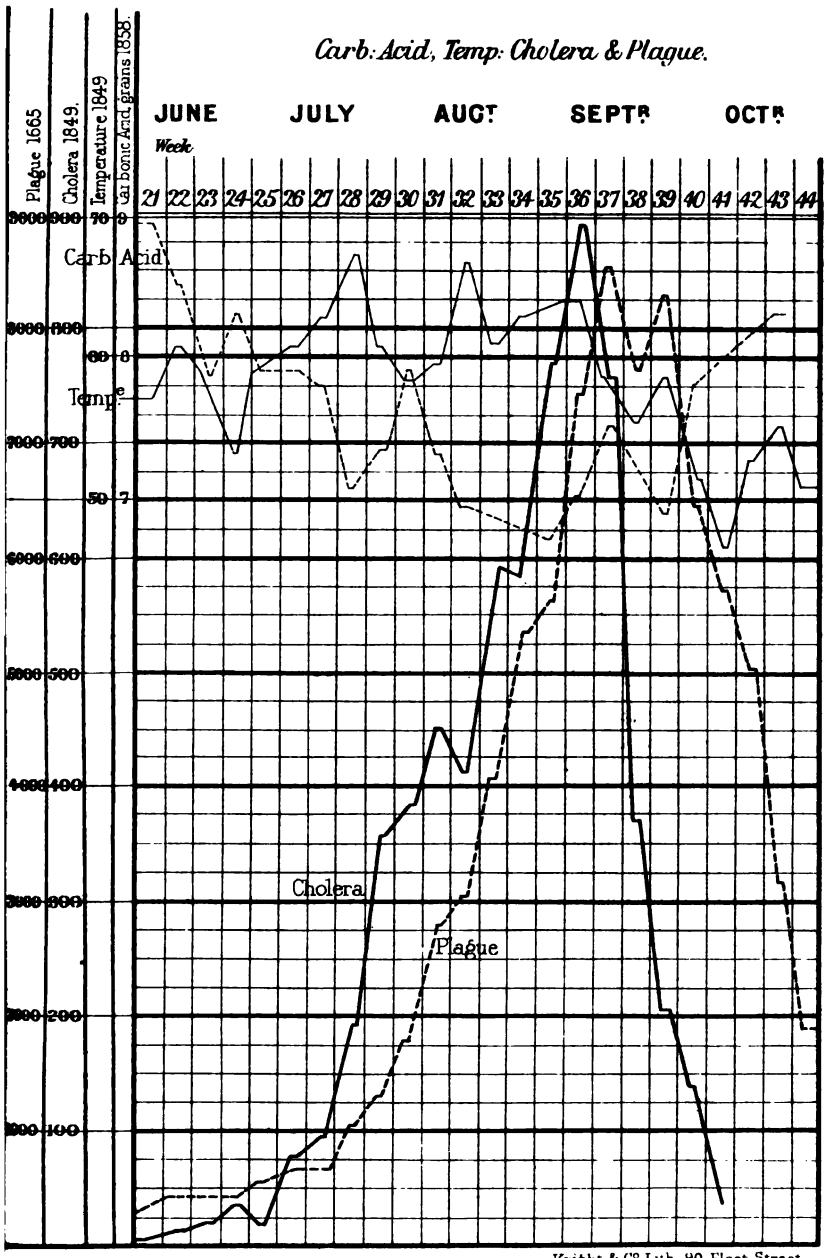
403. *The greatest mortality from the plague in England occurred at the minimum period of vitality.*

404. The various attacks of the disease known as the Plague, which occurred in London in the sixteenth and seventeenth centuries, exhibited the same features as the cholera of our day in reference to the question now under discussion, and show a remarkable similarity in the essential nature of the two diseases, as the following extracts from a table copied into the same report from Mr. Marshall's work on the Mortality of the Metropolis very clearly show.

(No. 43.)

TABLE SHOWING THE WEEKLY NUMBER OF DEATHS FROM THE PLAGUE IN LONDON, IN THE VARIOUS EPIDEMICS, CONTRASTED WITH THE USUAL MORTALITY IN OTHER YEARS.

Week.	Average of 7 Years, 1640–1646.	Periods of Plague.			
		1593.	1603.	1625.	1665.
27	211	850	267	640	684
28	214	1440	445	942	1006
29	210	1510	612	1222	1268
30	235	1491	1186	1741	1761
31	259	1507	1728	2850	2785
32	278	1503	2256	3583	3014
33	282	1550	2077	4517	4030
34	333	1532	3054	4855	5319
35	353	1508	2853	5205	5568
36	379	1490	3385	4841	7496
37	395	1210	3078	3897	8252
38	372	621	3129	3157	7690
39	373	629	2456	2148	8297
40	385	450	1961	1994	6460
41	364	..	1831	1236	5720
42	365	..	1312	838	5068
43	338	..	766	815	3219
44	320	..	425	661	1806
45	301	..	..	375	1388
46	284	..	..	..	1789
47	247	..	..	..	1359
48	247	..	..	..	405


Carb: Acid, Temp: Cholera & Plague.
JUNE
JULY
AUGT
SEPTR
OCTR
Week
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
Plague 1665
Cholera 1849.
Temperature 1849
Carbonic Acid grains 1838.
Carb Acid
Temp.e
Cholera
Plague
Knight & Co Lith 90, Fleet Street.

405. In each of these outbreaks it will be seen that the great development of the attack occurred in July, and reached its maximum point in the minimum months of vitality, viz. in August and September, whilst in November the disease had nearly disappeared.

406. *The greatest mortality in chest diseases is found in the periods of increasing and maximum vital action, and the least mortality at those of minimum vital action.*

407. This is shown by the deaths from bronchitis, pneumonia, and pleuritis, and especially in bronchitis, in which the extreme difference was so great as a defect of nearly 11 per cent. in the minimum and an excess of nearly 13 per cent. in the maximum period. There is no exception to be found in the returns in these two directions; but in reference to the second quarter of the year, in which there is a mixture of influences, we find that whilst the deaths from bronchitis were then in defect, those from pneumonia and pleuritis were still in excess—a fact doubtless owing to the admixture of the returns in April and May with those in June.

408. Pericarditis followed precisely the order of pneumonia, and had its maximum at the period of maximum vital action, and *vice versâ*, and the defect in the summer season was so much as 6½ per cent.

409. *Brain diseases prevail in the cold season.*

410. Apoplexy and epilepsy exhibited an excess of deaths in the increasing and maximum periods of vitality, and convulsions were in excess at the latter period only, whilst in all these diseases there was the least mortality at the periods of decreasing and minimum action.

411. *Eruptive diseases for the most part prevail at the seasons of change.*

412. This is a part of the subject worthy of the most profound study, and one which is necessarily most complicated in its details, for at the same period we find the confluence of two sets of causes which are antagonistic to each other, and which have to be reconciled by the system exposed to their influence. In the end of the struggle the conditions of the advancing season gain the mastery, but in the earlier period we are subjected to the evils of the soft, sensitive, perspiring skin of the end of summer being ex-

posed to the rude equinoctial blasts, the enfeebled powers of assimilation struggling more or less feebly to supply the increased vital transformation which the cooler weather demands, and the active pulsation of the heart opposed by the lessened action of the skin, which, being accompanied by contraction of the capillaries, offers an unusual obstacle to the current of the blood at the surface, and causes it to accumulate in the internal parts. These and other antagonistic influences are doubtless the cause of much autumnal disease, just as in the contrary conditions of spring we find spring diseases, all of which are due to the antagonistic influence of a new order of external phenomena upon a system which may not be able to adapt itself quickly enough to those novel influences.

413. We do not purpose to enter at length into this interesting question, but will only point out one or two of the most remarkable agreements or diversities to be met with in these seasonal diseases.

414. Scarlatina and typhus show a remarkable correspondence under this head, since both were most fatal in the increasing periods of vitality, and the least so in the next quarter when the vital powers were the highest. Measles and scarlatina offer as remarkable a contrast, for the greatest mortality from the former occurred at the period of decreasing and the latter at that of increasing vital changes. Smallpox offered less diversity than might perhaps have been expected (the cases of death are happily now few), but the least mortality was found with low vital action.

415. In seeking to connect epidemics and eruptive diseases with certain states of vitality of the system, we must especially bear in mind the caution already given, that the nature of the season will exert a great effect not only upon the type of that attack of the disease, but upon the month in which the maximum or minimum mortality will occur. Hence we are prepared to find that there was a retrocession in time in the epidemic of scarlatina in 1844 and 1848, and it is probable that measles will scarcely be more fatal in the second than in any other quarter if the spring and summer be cold. But these do not materially affect the general rule, that measles will be more fatal at the beginning of summer and scarlatina at the beginning of winter.

416. *The type of a disease has also reference to the conditions of the system which preceded its occurrence.*

417. This consideration is especially applicable to autumnal diseases, which occur with an increasing, but immediately follow the period of minimum, state of the vital powers. It has been often stated in the preceding pages that there is a progressive decline of the vital actions during two or three months at the middle and end of summer; but the minimum period is not an extended one—not so extended as the maximum period in the spring—and hence the upward tendency, which occurs at the middle of September, induces a somewhat sudden change in the vital actions, and during this period of change eruptive diseases, as scarlatina, are very apt to occur. It is therefore easy to understand that the type of a disease, commencing immediately on the occurrence of this change, will have more reference to the period of low vital power, which has just passed over, than that of the same disease appearing when the upward tendency has become well developed. The former would exhibit adynamic and the latter dynamic conditions.

418. Hence, not only must we look forward to the advancing season in order to judge of the type of any epidemic which may be existing, but we must have regard to the season which is just passing—or has very recently passed—in order to estimate rightly the type of the existing attack; and as this is particularly applicable to the seasons which we have called seasons of change, we may very well take scarlatina in the autumn and measles in the spring as illustrative of these two conditions. The early cases of scarlatina will be marked especially by exhaustion, and the latter by inflammatory complications, whilst the early cases of measles will be marked by inflammation, and the latter by prostration. The table under consideration shows that there is a decided difference in those two diseases as to the condition of system in which they commonly arise; but, as has already been intimated, should the conditions be transposed to other months, these diseases may assume each other's special characters.

419. An excess of seasonal conditions, whatever they may be, will induce an excess of seasonal disease; whilst any

marked defect of the former may cause the importation of diseases which are commonly restricted to other seasons.

VIABILITY OF INFANTS.

There is reason to believe that the viability of children is in a degree dependent upon the season of their birth. I worked out this enquiry in the office of the Registrar-General with the following results, as extracted from my work now under reference:—

335. On careful analysis and the exclusion of doubtful cases, 3050 cases were found in which the children had died within one year of birth, and in which the month of age at death was recorded. Of these it was found that the percentage of those born in the different months varied from less than 7 per cent. in February and 7 per cent. in September to nearly 11 per cent. in June, with a great progressive increase in May and June, and then a decrease in July, August, and September. During the months of October, November, and December, the proportion was tolerably stationary and somewhat under an uniform average of the whole year, viz. 8 per cent.; whilst in January it had risen to the uniform average, and in February it fell 1½ per cent., and rose in equal amount in March, in which month and in April the percentage was that found in January.

336. . . . . The greatest viability occurred in those born in the winter months, and the least in those born in the summer months. The months of May, June, July, and August, were those in which the greatest percentage of those born in them died during the first year of age. Hence it appears that this lessened viability is rather associated with the lessening powers of the human system at the season of birth than with the period of conception, ... and it may be inferred that in man, in common with so many animals, his offspring born in the cold season has a higher probability of life than when born in the hot season.

It is not possible, with our present knowledge, to perfectly isolate the several powers comprised in the term "season,"

and in fact we are limited very much to heat and moisture and the movement of the atmosphere; but the actual phenomena connected with them or due to them are fully indicated in the work just referred to.

The movement of certain epidemic diseases, as influenza, at the period of their existence is associated with the prevalence of winds, so that influenza passes rapidly in waves from one village to another in a tolerably defined route, and such movements should be attentively regarded.

The origin of all such meteorological conditions is involved in mystery, whether they be diphtheria, *Cynanche Maligna*, cholera, and fevers, or the modification of these diseases, and is not only enticing ground for speculation, but a promising one for careful investigation; yet as we have already referred to certain probable causes, we will not further consider them.

Section VII.

ADVICE TO BE GIVEN.*

The advice to be given by the medical officer of health will depend upon the results of his investigations as to the causes of the disease, the known or highly probable influence of certain existing conditions, with the means fitted to cure the disease, and, above all, those adapted to prevent the spread of it, and will include some of the following.

1.—*AS TO REFUSE AND SEWERAGE.*

The first and perhaps most important subject is that of

* See also page 314.

refuse matter, drains, and sewerage, so that all offensive substances from manure heaps, rubbish-heaps, pigstyes, petties, water-closets, sinks, and imperfect drains, may be removed, and will no doubt occupy his daily attention. The distance at which a petty or a pigsty should be placed from the house cannot be fixed with precision; but it should be such that with proper cleanliness no offensive smells shall be perceived in or very near the house.

Attempts have been made to prevent the use of pigstyes by cottagers, on the plea that they are always offensive and rarely clean; but the pecuniary value of a pig to a cottager who has a little garden and refuse vegetable food is so great that such a prohibition would be a great pecuniary disadvantage, and indirectly injurious to health; but it is possible to provide, under a penalty, that they shall be kept cleanly, and at a reasonable distance from the house.

The disposal of fœcal matter, whether in town or country, is at the present moment a matter of great difficulty.

In towns with a general system of sewerage such matter is almost invariably cast into the sewer to be disposed of by the local authorities, and until recent legislation prevailed, it was generally carried into rivers to their pollution and to the loss of valuable manure. As this mode is now illegal, it becomes necessary to devise another plan, and, if possible, one that may be remunerative, by utilising the night soil upon the land. This is not a fitting opportunity to enter at large into this question, since it falls rather to the engineer than the medical officer of health; but it may be proper to make some reference to it.

All authorities agree that the excreta of man as of animals are of very great value as fertilisers, and I think that all are

now agreed that they should be so employed; but the difficulty in the way has been the unremunerative character of the sewage when the excreta are very largely diluted with water, and the aim has been to get rid of as much of the water as possible.

In reference to its value, we need refer only to the experiments in the neighbourhood of Edinburgh, where crops and rents to a fabulous amount have been obtained from land which was previously unproductive. The great sewerage scheme of London is also connected with the disposal of the sewerage on a plain of sand—that is to say, on land differing but little from that near Edinburgh.

A report of Mr. Arnold, on the disposal of sewage at Merthyr Tydvil, which has just reached me, shows that land thus irrigated (the filtration area) has produced 43*l.* per acre in crops of vegetables, and 30*l.* in rye-grass.

As to the second proposition, if the first be proved, the only question remaining is the offensiveness of the sewage when thus distributed over the land, and if that quality can be removed, no objection can be taken to the plan produced.

There can be no doubt that sewage matter taken direct from the sewer and distributed over the land is offensive, and might properly be deemed a nuisance; but this is not necessary, and other plans have been adopted by which the objection is removed.

The three plans which merit chief consideration are:—

1. The use of filtering and deodorising areas;

2. The separation of the more solid from the more fluid part of the sewage, with the deodorisation and use of the former, and the deodorisation and escape of the latter;

3. The utilisation of the sewage in transition for the preparation of cement and manure.

The first plan is that in use at Merthyr Tydvil, and consists of preparing a filtering bed of soil with drains six feet deep, through which all the sewage fluid passes, and is carried away, whilst the solid and valuable part remains in the soil. As Mr. Arnold Taylor's report on this subject is short, and raises many of the questions which merit consideration, I will insert it.

THE SEWAGE OUTFALL AND EARTH FILTRATION WORKS AT MERTHYR TYDVIL, GLAMORGANSHIRE.

REPORT on these Works after an Inspection of them made on August 31st, 1872.

LOCAL GOVERNMENT ACT DEPARTMENT,
WHITEHALL, LONDON,
November 8th, 1872.

To the Right Honourable James Stansfeld, M.P., President of the Local Government Board.

SIR,—The successful operation of the above works has naturally attracted the attention of all who wish to see some hopeful solution of the sewage disposal question.

Amongst others, the Wimbledon Local Board have been recommended to apply the Merthyr system to the sewage of their district, and I lay before you, along with this Report, one upon an enquiry held by me at Wimbledon in July and August last, relative to the taking, by compulsory purchase, under Provisional Order, of twenty acres of land there for the purification of the sewage on the Merthyr system of intermittent earth filtration.

I am, therefore, anxious to give as full, fair, and accurate an account as I can of the Merthyr district and works.

First, then, the Merthyr Local Board of Health were placed under Chancery injunction for the sewage pollution

of the river Taff in the year 1868, in consequence of which, during the year following, they petitioned this department for Provisional Order to take, by compulsory purchase, 393 acres of land for irrigation purposes.

In 1870, a Provisional Order, granted by the Secretary of State, after enquiry in the district and report by me, was subsequently confirmed by Parliament in the session of that year.

Of the land taken, 74 acres are close to the town of Merthyr, at Troedirhiew; the other 320 are more than six miles off, the valley of the Taff being so narrow that, with the exception of the above 74 acres, no more land suitable for irrigation could be found nearer the town.

The Court of Chancery, in granting an injunction against the Merthyr Local Board, appointed Mr. Bailey Denton, C.E., to act as their engineering adviser. As soon, therefore, as the local board were in possession of the land at Troedirhiew, they were directed by Mr. Denton to take twenty acres and divide them into four plots of five acres each, carefully to subsoil drain the same six feet deep, to pare the surface, dress it into ridges fifteen inches apart, then to crop it, and pass the whole of the sewage from the main outfall on to each of the areas in succession.

For the sake of conciseness, I am now giving the final arrangements on the twenty acres.

But, in point of fact, the present state of things there is the result of two or three successive requirements of Mr. Denton before the complete purification of the sewage had been effected.

Whilst the local board were carrying out Mr. Denton's requirements on the twenty acres, they were also preparing the other fifty-four acres of their land at Troedirhiew for ordinary sewage irrigation. Thus the filtration land was ready in January and the irrigation land in March 1871.

The population of the district draining into the river Taff is estimated at 40,000, of whom about 20,000 are living in houses directly connected with the existing sewers; the other 20,000, having cesspool or surface drainage only, or perhaps no drainage at all, contribute but little to the existing volume of sewage.

This should be borne in mind, because I see it constantly

stated in the newspapers and elsewhere that the sewage of the population of Merthyr, *i. e.* 40,000 people, is being successfully purified upon 20 acres of land at Troedirhiew. The fact is, that for some four or five months at most, viz. from January to May 1871, the sewage of 20,000 people *was* run on to the 20 acres of filtration area. But after that time, and to the present moment, one-half only of this sewage of 20,000 people has gone to the 20 acres, the other half having, since June 1871, been continuously applied to the 54 acres of adjoining land under ordinary irrigation.

I do not wish to be misunderstood. The filtration process at Merthyr must be regarded by everyone who visits the place as a very great success, and Mr. Denton is justly entitled to the credit of having first applied on a large scale a system which Dr. Frankland had previously worked out in a series of careful laboratory experiments.

But just because it is so successful, does it seem to me of importance that the exact truth should be stated with respect to earth filtration, as a means of sewage purification.

I wish first to note that one of the great elements in the success of the Merthyr system is due to the nature of the surface and of the subsoil at Troedirhiew. The former being a light alluvial soil, whilst the latter consists of a very deep bed of porous gravel, so constantly charged with water that the outflow from the deep 6 feet subsoil drains on the 20 acres is never less than four times larger than the volume of sewage which may have been passed on to the surface of the filter beds.

The Taff is a river with a very rapid fall, 500 feet in 24 miles, or upwards of 20 feet per mile. Hence, though the filtration land is almost on a level with the river, there has been no difficulty in thoroughly subsoil draining it to the required depth of 6 feet. The outfall from the land is into a field ditch, and thence into the Taff, a mile or more lower down the valley than the filtration area and irrigation farm.

Mr. Harper, the engineer to the Merthyr Local Board, keeps a careful gauge register of the daily quantity of sewage which is run on to both the farm and the filters.

The following are the quantities he has given me :—

The volume of sewage per day in dry winter weather is 1,048,000 gallons.

In summer the volume of sewage varies from 700,000 to 900,000 gallons.

In the summer of 1872 the minimum daily volume has been 812,000 gallons.

Therefore at present, and for the last twelve months at least, the irrigation farm has been taking half of these quantities, or at the rate of from 7400 to 9260 gallons per acre per day, whilst the filtration areas have been purifying at the rate of from 20,000 to 25,000 gallons of sewage per day, assuming the daily volume of sewage to vary from 800,000 to 1,000,000 gallons. The rainfall in the Taff valley is excessive. Hence the above quantities give a volume of sewage varying from a minimum of 35 to a maximum of 52 gallons per head per day of the estimated 20,000 population.

In spite, however, of their large quantities, the filtration areas, when I saw them on 31st August 1872, were quite clean and pure from all offensive smell or deposit. Large and abundant crops of vegetables were growing on the ridges, and amongst these I noted cabbages, potatoes, mangolds, and turnips.

Rye-grass does not succeed. Whether it be the greater saturation of the soil or not, I am unable to say, but the blade will not stand up.

On the irrigation farm adjoining (where the sewage of 200 people per acre was being applied) there were, besides the same crops as on the filtration area, rye-grass, Swede turnips, beetroot, leeks, onions, parsnips, brocoli, celery, and other smaller vegetables.

From the filtration area the local board have sold vegetables producing from 43*l.* to 22*l.* per acre. On the irrigation farm the rye-grass this year was estimated to yield 30*l.* per acre profit (rent of land not included), and the vegetable crops would, it was expected, be equally valuable.

All these results are so satisfactory that the Merthyr Local Board are pushing on the preparation of the remainder of their irrigation land at the mouth of the Taff valley, where they hope to have 200 acres ready for sewage treatment in the course of the present winter, the outfall sewer itself being already all but completed to the irrigation land.

The success of the irrigation and filtration scheme at Troedirhiew is shown by the fact that the local board have almost determined to diminish the area of their irrigation land, and to take only 281 instead of 393 acres, which they are empowered to purchase under the Local Government Supplemental Act, 1870 (No. 2), 33 & 34 Vict. c. 165.

As some of the land has been purchased on very reasonable terms, there is ground to believe that when the whole of the farm is under sewage, it will produce a return sufficient to meet the entire cost of the works, even though the latter have involved so heavy an outlay as the construction of a main outfall sewer nearly seven miles in length.

I assume that in the present winter, or during next spring at latest, upon the completion of the preparation of the irrigation land at the mouth of the Taff valley, the twenty acres of filtration area at Troedirhiew will cease to have any excess of sewage applied to them, and that they will come under the ordinary conditions and treatment of the rest of the land.

If I am right in this assumption, then the exact history of the Merthyr case will be this, that for some five months, say from January to June 1871, twenty acres of land, most exceptionally situated and very carefully prepared, were found sufficient to purify a volume of sewage from 20,000 persons, equal to a daily discharge of say 900,000 gallons, or at the rate of 45,000 gallons per acre per day.

That for the next eighteen months the same twenty acres are found capable of purifying half this quantity, the rest being distributed and purified over the fifty-four acres of irrigated area.

When I saw the land at Troedirhiew last August, my impression was this, that the twenty acres of filtration area did show signs here and there of saturation, and that though the appearance of the surface and of the crops grown upon it was wonderful, regard being had to the quantity of sewage which had been poured upon so small an area, yet that the appearance of the crops and the surface of the fifty-four acres of the adjoining irrigation farm was in all respects the better of the two.

It is stated by Mr. Harper that he has dug trial holes at various points of the filtration area, and that in none

of them has he found any signs of earth saturation or of offensiveness. Hence it may be argued that by a continuance of the present intermittent system of filtration, one five-acre area being in use at a time, whilst the other three are at rest, the land is capable of being used for an indefinite period of time.

This may be so; but what I urge is, that the twenty acres of earth filters at Merthyr purified the sewage of 20,000 people for at most five or six months, that since then they have purified the sewage of 10,000 people, and that by the end of this year or the early part of next, they may have ceased altogether to act as continuous earth filters.

The Merthyr system may therefore be certainly quoted as an example of successful sewage purification, but the following exceptional favourable conditions and circumstances ought, at the same time, to be taken into account.

First, then, at Troedirhiew, where the filter areas are situated, there is no population which is likely to be at all sensitive on the subject of nuisance from any offensive smells or emanations.

Second. The surface soil is light and of a kind the best suited for active filtration.

Third. The subsoil, a deep bed of open, porous, water-charged gravel, not only acts most favourably as a natural filter, but also gives to the sewage liquid, after it has passed through six feet of earth, some three or four times its own bulk of pure water.

These are favouring circumstances which cannot easily be found in combination.

They are found at Troedirhiew, and hence, in my opinion, the main cause of the success of the system of intermittent earth filtration as applied to the purification of the Merthyr sewage.

But I believe that this success will be even more marked when the larger area for irrigation purposes is completed, for then, if earth filtration be practised at all, it will only be resorted to on an emergency or in wet or winter weather.

I have the honour to be, Sir,
Your most obedient servant,
(Signed) ARNOLD TAYLOR.

This plan is of easy adoption, and applicable to any village or moderate-sized town, and it is clear that, if properly carried out, it may be remunerative to the rate-payers, and, by utilising so much manure, will increase the public wealth.

The second class of operations is that adopted in the disposal of the London sewage. There seems to be no difficulty in so deodorising the liquid that it may be legally allowed to run into rivers, but this part of the scheme is not remunerative, and as to the solid material, it must be removed in carts or by boats, by which expense is incurred, which greatly diminishes the profits. The whole scheme is costly, and not likely to be self-supporting.

The third plan includes the lime process and the A B C process, the latter making use of animal charcoal, blood, and alum refuse. It also embraces that recently devised by General Scott, who, by adding a proportion of clay and lime to the sewage as it passes through the sewers, causes a deposition of the solid parts at the outfall, which he utilises as cement and manure, as explained in the following summary description :—

General Scott adds to the sewage either lime alone or lime mixed with clay, and suspended in water, and he obtains a precipitate which contains all the lime and clay employed, all the sludge of the sewage, and some of the lime which the sewage water held in solution. The large excess of lime which this precipitate contains serves to arrest or prevent putrefaction, so that it can be dried without offence, and stored as long as may be necessary for the purposes to which it is eventually to be applied. These purposes are twofold : first, the making of cement ; secondly, the making of agricultural lime. If a very hard cement, equal to Portland cement, is required, a definite proportion of clay

must form part of the precipitant, and the dried precipitate must be burnt at a strong heat, and to a great degree of hardness. It then requires grinding in very powerful mills; and the cost of the necessary plant would place a difficulty in the way of this manufacture in any but large places, where there would be a considerable yield. A softer cement may, however, be made more easily, and by the addition of a proportion of clay that requires less nice adjustment; and the manufacture of agricultural lime may be undertaken anywhere. For this purpose no clay is required, and lime is the sole precipitant. The ultimate product will contain all the lime originally employed, together with a variable addition which is yielded by the sewage itself. In all these applications the fuel for combustion is furnished by the organic matter of the sludge, and this, the great stumbling-block of other systems, is first rendered innocuous, and is next totally decomposed and destroyed. The population of Ealing is now about 10,000, and the sewage works are situated a short distance from the town. The tanks were originally constructed for some other process, and are, therefore, less perfectly adapted than they might be for that to which they have been made subservient. Where the outfall sewer enters the premises, it passes under a vessel containing a milk of lime, with or without an admixture of clay, and receives from this a stream of regulated amount. The mixture flows on, passing first through a coarse strainer to remove various adventitious substances, and then past stirring rods, to insure a thorough commingling. It is next received in a series of subsidence tanks, and is finally made to ascend through gravel filters, from which the clear effluent passes away into an adjacent stream. The tanks at Ealing are arranged in two sets, for alternate use, and when a sufficient quantity of slush has accumulated in either set, it is drawn out below and received in a reservoir for the purpose. Formerly it was dried in a sort of furnace, but this plan has been abandoned in favour of pressure. The slush, while still sufficiently liquid, is pumped into a press such as is used in the preparation of clay for pottery, and the liquid that is squeezed out is pumped back to rejoin the entering stream of sewage. The press consists of a series of channeled wooden boards, placed side by side in a frame, and each

furnished on one side with a double sheet of calico capable of being folded into a sort of bag. The slush is pumped into all the bags simultaneously through a stand pipe, which connects with a nozzle fitted to each, and the calico retains the solids while it suffers the fluid to escape. The continued pumping at last not only fills the bag with solid matter, but compresses them between the boards in such a way that this matter is formed into a cake, somewhat after the fashion of oil-cake, and firm enough to be cut into pieces of suitable size, which are stacked for future use. The "cake," so prepared, undergoes no further change beyond losing a little moisture in dry weather. It emits no offensive odour, or nothing beyond a faint mouldy smell; and large heaps of it may be collected together without any nuisance being occasioned. For burning it, General Scott has employed a kiln with downward draught, so that no fetid gases escape into the atmosphere; and with a single small kiln at Ealing he has made all the products which have been mentioned—hard cement, tender cement, and agricultural lime. The cements have been fully tested in practice, and have been found to be of excellent quality; but the lime has not yet been applied in any quantity to land. Analysis of its composition, however, shows that it would be exceptionally valuable for this purpose by reason of the amount of phosphate which it contains; and General Scott calculates that every ton would carry to the soil a quantity of phosphate of lime equal to that contained in 535 lbs. of bone dust. An important element in so dealing with sewage as to obtain from it the minimum of annoyance is to subject it to chemical reagents as soon as possible. Under ordinary circumstances, however, a portion of the slush is deposited on the walls of a sewer, lining them with a viscid coating which is far advanced in decomposition, and is the chief source of noxious and offensive gases. An unusual rush of storm water will carry away this coating, with the result that, after rain, the works do not receive, as might have been expected, a larger quantity than usual of a diluted sewage, but a larger quantity that is of unusually bad character. In order to obviate this difficulty, General Scott has tried the effect of introducing his milk of lime into the sewer far above the outfall, and he has had the gratification of finding that this

plan not only checks putrefaction and arrests the development of gas, but that it also mechanically scours the sides of the sewer, and prevents the accumulation of deposit. The main sewer at Ealing, when thus treated, can be traversed without inconvenience; and General Scott has lately suggested that the milk of lime employed should be charged with chlorine, so as to fill the sewer with a more or less chlorinated atmosphere, which would find its way into the side drains also, especially if any gas from them found its way into houses.

With any system of sewerage care should be taken to properly ventilate the sewers, and to prevent the return of foul and noxious gases into the houses or water-closets. This will be required particularly at the higher level of the drains, since there the gases of light specific gravity accumulate; but they should be also at other levels. Wherever placed, they should be carried to an elevation above that of the houses, and, if possible, should not be near habitations. Ventilating doors into the street are offensive and noxious, and not fit even for a barbarous age and people; yet they are found in the most wealthy streets and squares of London and other large towns.

In effecting this, it may not be possible to entirely dissever the system of large drains from that of the small communications with houses, but it is clear that in both ventilation should be adopted, and also that in the latter the danger of want of ventilation, or of an erroneous plan of ventilation, is the greatest.

It must also be added that the utmost watchfulness should be exercised over the fittings of water-closets with a view to insist upon a sufficient and constant supply of water and perfect trapping. Moreover, such improvements in the construction of water-closets as not only effect

these two objects with the greatest simplicity and completeness, but also deodorise the liquid, solid, and gaseous excreta, should be recommended.

But in small villages it may be impossible, at any reasonable cost per head of the population, to provide a general system of sewerage; and, moreover, it is at least very doubtful whether the valuable fœcal matter may not be equally well and more readily utilised without it.

The present cesspit arrangement is usually offensive, and from the decomposition of the nitrogenous material, a considerable reduction in the value of the excreta as manure is effected. It is true that, if the cesspit be of suitable dimensions and covered over, yet so that dry ashes can be thrown over the mass, much decomposition may be prevented, and the offensive smell is perceived chiefly or only within the privy. If such a cesspit were emptied every few weeks, and the whole material at once used as manure, it would be very valuable, but such an operation gives rise to offensive odours at the cesspit itself, in the route of the conveyed matter, and on the land where it is ultimately placed.

Nearly all these evils are prevented by the use of the earth-closet system, and the value of the product abundantly repays the labour and care expended on it. All that is necessary is to provide a box instead of a cesspool for the petty, which is placed under the seat, and another box to contain fine ashes or dry earth, of which a portion is to be cast into the seat-box after every occasion of its use. The ashes are readily obtained from coal ashes, and particularly in those parts of the country where there is an ash-pit and grate in front of the fireplace to contain the riddled ashes; and elsewhere the garden soil may be dried

by keeping a portion of it in the house, or, where possible, by drying it on the oven plate.

It is not, however, so convenient in those parts of the country where coal is particularly dear, and to those classes who are not able to make a fire daily, or to those who have not a patch of garden land.

The cost of the seat-box is but small, and may be made of wood iron-bound, or of iron, and neither so large nor so heavy as to offer much difficulty in its removal.

Several patents have been taken out in reference to the material used, as well as to the apparatus employed, and companies have been established to give effect to them. In some places, as at Manchester, the material is ashes; whilst a coarse kind of peat is now largely used for the same purpose, and becomes itself a part of the manure.

Mr. Cheshire, of Birmingham, has devised an efficient apparatus by which the urine is separated from the fæces, and such a separation is also provided for in many kinds of earth-closets.

M. Badin has patented a plan now in use experimentally at the Great Eastern Railway, by which this separation is effected by the aid of spent tan, which is at length mixed up with the fæces as manure. The following short description appeared in the *Lancet* of February 8, 1873 :—

> The apparatus consists of a truncated cone of wire gauze, which is fixed, base downwards, in a cylinder of perforated metal. The cylinder is surrounded by, and nearly fills, a strong water-tight cylinder of galvanised iron, connected by a union joint with an air-tight cistern. The outer cylinder is about three feet high. The space between the cone and the inner cylinder is filled with some porous substance—with spent tan, in the experiment which we witnessed. This substance, whatever it may be, is saturated

with some powerful antiseptic compound. The excreta, both solid and liquid, fall into the cone, the mouth of which is about six inches in diameter. Here the solids are retained, while the liquids filter through the tan, are disinfected in their passage, and finally pass into the outer cylinder, and thence to the tank. The cylinders must, of course, be changed by the company when full, and the tank emptied; but it is calculated that the apparatus is large enough to retain the whole excreta of one adult for twelve months, so that with a family of six it would only be necessary to change the cylinder every two months. When full, the cylinder with its contents, and the liquid in the tank, are to be removed to the company's works, the liquid boiled down, and mixed with the solids, tan and all, taken from the cylinder. The whole is then dried, pulverised, and sold as "human guano."

Legal provision has been made for this object in the following clause:—

THE SANITARY ACT, 1866.

(31 & 32 Vict. c. 115.)

Earth Closets.

Section 7.—Any enactment of any Act of Parliament in force in any place requiring the construction of a water-closet shall, with the approval of the local authority, be satisfied by the construction of an earth-closet, or other place for the reception and deodorisation of fœcal matter, made and used in accordance with any regulation from time to time issued by the local authority;

The local authority may, as respects any houses in which such earth-closets or other places as aforesaid are in use with their approval dispense with the supply of water required by any contract or enactment to be furnished to water-closets, in such houses, on such terms as may be agreed upon between such authority and the persons or body of persons providing or required to provide such water;

The local authority may themselves undertake or contract with any person to undertake a supply of dry earth

or other deodorising substances to any house or houses within their district for the purpose of any earth-closets or other places as aforesaid;

The local authority may themselves construct or require to be constructed earth-closets or other such places as aforesaid in all cases where, under any enactment in force, they might construct water-closets or privies, or require the same to be constructed with this restriction, that no person shall be required to construct an earth-closet or other place as aforesaid in any house instead of a water-closet if he prefer to comply with the provisions of the enactment in force requiring the construction of a water-closet, and a supply of water for other purposes is furnished to such house, and that no person shall be put to greater expense in constructing an earth-closet or other place as aforesaid than he would be put to by compliance with the provisions of any enactment as to water-closets or privy accommodation which he might have been compelled to comply with if this section had not been passed.

Local authority shall for the purposes of this Act mean "any local board" and "any sewer authority."

2.—*AS TO WATER.**

The next subject in importance is the drinking-water, and as we have already fully entered into it, we will not say more here than to recommend the entire disuse of any contaminated water if a better supply can be obtained, or if it must be drunk, to direct that it be previously boiled. This must depend upon the importance of the contamination, but any direction which tends to limit the use of water [illegible]re to be forgotten or disobeyed by the children or oth[illegible]embers of the family, and nothing short of entire exclus[illegible] can be a sufficient preventive.

Where[illegible]wever, there is no general distribution of water, and the s[illegible] is from a ditch or brook, it is desirable to ascertain whether the impurity is simply innocuous soil in a

* See also page 97.

state of suspension or decomposing matter, and if the former only, the water may be sufficiently purified by allowing the soil to subside. Such a source is still very common in country places, and none other is open to the inhabitants; but it is always a suspicious one, and the possible occurrence of noxious impurities from pigstyes, petties, and surface-slops, should be carefully considered before advice is given.

3.—*SPECIAL IMPURITIES.*

Any special source of impurity, such as the refuse blood in slaughterhouses and knackers' yards, and various manufacturing products, should be removed if injurious to health.

4.—*DISINFECTION.**

The subject of disinfection of rooms and clothing demands special consideration. It should be well understood that to deodorise is not necessarily to disinfect; neither will it suffice to attempt to mask a particular odour by another; and yet it is probable that nearly all so-called disinfectants are simply deodorisers, so far as refers to living organisms and animal products generally. Hence, the prudent course is to really disinfect whenever it is practicable to do so.

It may be admitted that for all sanitary purposes boiling water, if properly applied, will really disinfect. The clothes, linen, and bedding should be placed in boiling water as they are removed from the patient, and kept boiling for about half an hour, being stirred with a stick from time to time, so that every part of the mass shall acquire a temperature of 212°. It is not sufficient to throw them into boiling water and then allow the temperature to fall, and to remove them quickly, for time and care are required to raise every part of

* See also page 86.

a mass of material in boiling water to the temperature of 212°. When, however, they have been properly treated, there is no ground to fear spread of contagion from them. This may be effected without difficulty in almost any locality, for a boiler which may be properly heated will be found near, or one may be quickly and cheaply erected.

It is also necessary to bear in mind that disease may be spread by the linen before it reaches the boiling water, and therefore the most precise directions should be given for it to be conveyed by one person direct from the patient to the boiler, and delivered into the boiling water. No accumulation of such infected material should be allowed, nor several persons allowed to handle it.

The effectual application of dry heat is much more difficult, since it requires a special apparatus, and in practice it is found that the heat produced is very uncertain, sometimes burning the clothes, and at others remaining below 212°. If a convenient oven be at hand, and the temperature can be so regulated that it shall not be less than 212°, or more than 300°, it may be used, but it is somewhat doubtful whether the same reliance can be placed upon 212° dry heat as on the same temperature of water, having regard to the power of solution which water possesses by which the infection may be more readily removed from the linen. Bearing in mind that the application of boiling water is always practicable, and that the proper temperature is indicated by the fact of its boiling, that method is to be preferred.

The circumstances under which it may be necessary to burn clothing and linen are very few, as, for example, if it be already worn out and without value, or if the means of boiling it are not at hand, and the danger of infection is

urgent. The bed-ticks may be boiled, but the flock, if saturated or otherwise infected, should be burnt. Feathers, hair, and cocoa-fibre may be disinfected by dry heat, or, in the case of the cocoa-fibre, by hot water. As hair and fibre are nearly impervious to moisture, they are but rarely media of infection, and any infecting material which may attach to them is readily removed, but feathers may retain a considerable amount of infectious matter, and, if they cannot be properly and readily exposed to dry heat, should be destroyed. It is not, however, necessary to destroy the bed because the tick may be infected, unless it be shown that the infecting material has passed through the tick.

The discharges of every kind should be buried in the soil where practicable, and, when otherwise, should be carefully carried away, and so disposed of that they cannot come again into contact with mankind.

The emanations from the breath and skin by which the air of the room may become charged cannot be entirely destroyed by any method, so long as the patient remains in the room, without possible injury to him, and may be rendered harmless only by dilution with air, and removal by complete ventilation. The use of chloride of lime or similar disinfectants in the sick room has the advantage of diminishing or destroying such disagreeable odours, and so far is valuable, but it would not be wise to assume that the air had thus been disinfected, and is harmless as respects the healthy. After the room has been emptied, it is possible to clear out the foul air, and by cleansing and lime-washing to remove infection from the walls or furniture, whilst so large an amount of chlorine gas may be generated as to materially assist in the process of disinfection.

It cannot be necessary to scrape the walls of an infected

room unless they have been soiled with the infected matter, for whatever gases may have been absorbed by the lime or mortar will be destroyed by the solution of quicklime. The most satisfactory course is to leave the room unoccupied for a time, and to completely renew the air by external openings night and day,

Cleansing the floors of infected rooms is oftentimes a difficult process, inasmuch as infected matter may have been absorbed by the wood and have entered the joints between the boards. Special attention should therefore be given to the state of the floor, and disinfectants as well as boiling water used freely at the infected places.

The cleansing of utensils is not usually very difficult, since they are commonly of earthenware or glass, and therefore impervious, and may be perfectly cleansed by the aid of boiling water. It is, however, of the highest moment to be assured that they have been properly cleansed.

The following is a list of the most useful disinfectants :—

(No. 44.)

Chloride of lime, in powder ;
Solution of chloride of lime ;
Carbolic acid ;
Carbolate of lime ;
Chloralum ;
Condy's red fluid ;
Dry earth ;
Quicklime ;
Charcoal ;
Perchloride of iron ;
Chlorine and bromine ;
Sulphurous acid gas.

The object sought by the use of disinfectants, as distinguished from deodorants, is to destroy protoplasmic or germ life in the substances to which they may be added. Dr. Grace Calvert conducted an extended series of researches, with a view to determine this quality, which he brought before the attention of the Royal Society last year, and has just issued as a separate pamphlet. They are well worthy the attention of medical officers of health, and are quoted in the table on next page.

As a basis of comparison, he dissolved 1 part of albumen in 1000 parts of water distilled in such a manner as to be absolutely free from life germs, and then determined the number of days required for the development of life, and the other subjects contained in the table, when kept in and out of his laboratory. The addition of various substances was made, and the effect upon the development of life, &c. ascertained. The solutions were kept at a tolerably uniform temperature of 55° to 60° Fahr.

From this table it appears—

1. Those which present the development of protoplasmic or fungus life are carbolic and cresylic acids;
2. Those which arrest the production of vibrio life, but do not that of fungus life, are chloride of zinc and bichloride of mercury;
3. Those which permit the production of vibrio life, but prevent the appearance of fungus life, are lime, sulphate of quinine, pepper, turpentine, and prussic acid;
4. Those which allow the development of protoplasmic or fungus life are the whole of the remaining twenty-five substances.

(No. 45.)

EFFECT OF DISINFECTANTS.

Substances used.	Number of days required for development of life.	Time after which putrid odour could be detected.	Number of days required for development of fungus life.	Number of days after which mouldy odour could be detected.
Albumen solution kept in laboratory	12	50	18	None
Albumen solution outside laboratory	5	19	None	None
Sulphurous acid	11	..	21	..
Sulphuric acid	9	..	9	11
Nitric acid	10	50	10	23
Arsenious acid	22	..	18	50
Acetic acid	30	..	9	50
Prussic acid	9	23	No fungus life appeared	..
Soda	23	31	18	29
Potash	16	..	..	..
Ammonia	24	50	20	None
Lime	13	19	None	None
Solution of chlorine	7	21	21	..
Chloride of sodium	14	50	50	..
Chloride of calcium	7	None	18	50
Chloride of aluminium	10	None	21	50
Chloride of zinc	None	None	50	None
Bichloride of mercury	None	None	81	None
Bleaching powder	7	18	16	..
Chlorate of potash	17	None	19	None
Sulphate of lime	9	24	19	None
Sulphate of protoxide of iron	7	None	15	..
Bisulphite of lime	11	21	14	None
Hyposulphite of soda	11	50	18	None
Phosphate of soda	13	None	17	23
Phosphate of lime	7	26	22	None
Permanganate of potash	9	50	22	None
Carbolic acid	None	None	None	None
Cresylic acid	None	None	None	None
Turpentine	14	None	42	None
Sulphocarbolate of potash	16	33	17	21
Sulphocarbolate of soda	18	50	19	25
Sulphocarbolate of zinc	None	None	27	50
Sulphate of quinine	26	None	None	None
Picric acid	17	None	19	65
Pepper	8	None	None	None
Charcoal	6	50	21	None

Dr. Calvert also affirms that blèaching powder is of no value as a preventive of decay or putrefaction, and M. Devergie, director of the Morgue at Paris, states that corpses decay more rapidly if placed in contact with that substance, or a solution of it, than if water alone is employed. Dr. Calvert also remarks that the "peculiar power of sulphate of quinine to arrest the production of fungus life deserves notice, especially when considered in connection with the remarkable efficacy which quinine exerts in cases of intermittent fever, and leads to the inference that this class of disease may be due to the introduction into the human system of fungus germs."

As near an approach to isolation as may be practicable is imperative in certain diseases of this class, as, for example, smallpox, whilst it is desirable in others, as typhus-fever. When it is determined upon, it should be carefully carried out, and the patient and one attendant strictly confined within certain limits. None should be allowed to go between the infected and the healthy. All linen and utensils should be disinfected either before leaving the hands of the attendant or immediately she has delivered them outside her *cordon sanitaire.* The attendant should frequently wash her hands, and her clothes and linen should also be disinfected.

The difficulty of effecting perfect isolation is extreme in any house where there are relatives and friends, and particularly in a cottage or single room, and in the latter case it may be impracticable. This implies the removal of the healthy. If it be possible to remove the sick to an hospital, the difficulty will be reduced to a minimum, but it can usually be effected only in a very early stage, and even then the friends may interpose to prevent, or the distance of the

hospital may be too great. This is no doubt the proper course in all dangerous infectious diseases where it is practicable, and proper hospitals should be established at convenient distances.

There is also danger to others in the removal, as well as to the sick, lest the carriage should become infected, and give the infection of one disease to an infected person suffering from another disease, or that a carriage so treated should be used by the healthy. The danger will be lessened, but not entirely removed, when ambulances for this class of cases shall be within an easy distance of every sick person.

Many of these directions imply the necessity for a trustworthy and trained nurse to be employed at the homes of the sick.

The possibility of perfectly arresting the disease will depend upon the care with which the first case or cases are treated, and the utmost efforts should then be made.

CHAPTER III.

REPORTS OF THE INSPECTOR OF NUISANCES IN REFERENCE TO OVERCROWDING, ETC.

7. ON RECEIVING INFORMATION FROM THE INSPECTOR OF NUISANCES THAT HIS INTERVENTION IS REQUIRED IN CONSEQUENCE OF THE EXISTENCE OF ANY NUISANCE INJURIOUS TO HEALTH, OR OF ANY OVERCROWDING IN A HOUSE, HE SHALL, AS EARLY AS PRACTICABLE, TAKE SUCH STEPS AUTHORISED BY THE STATUTES IN THAT BEHALF AS THE CIRCUMSTANCES OF THE CASE MAY JUSTIFY AND REQUIRE.

THE following are the enactments relating to overcrowding, and to premises unfit for human habitation:—

THE NUISANCES' REMOVAL ACT FOR ENGLAND, 1855. (18 & 19 Vict. c. 111.)

Overcrowded Houses.

Section 29.—Whenever the *medical officer of health*, if there be one, or, if none, whenever two qualified medical practitioners, shall certify to the local authority that any house is so overcrowded as to be dangerous or prejudicial to the health of the inhabitants, and the inhabitants shall consist of more than one family, the local authority shall cause proceedings to be taken before the justices to abate such overcrowding, and the justices shall thereupon make such order as they may think fit, and the person permitting such overcrowding shall forfeit a sum not exceeding forty shillings.

The Sanitary Act, 1866.
(29 & 30 Vict. c. 90.)

Overcrowding.

Section 19.—The word "nuisance," under the Nuisances' Removal Acts, shall include—

(1) Any house, or part of a house, so overcrowded as to be dangerous to the health of the inmates.

In Cities, Boroughs, or Towns, Secretary of State, on Application of Nuisance Authority, may empower them to make Regulations as to Lodging-houses.

Section 35.—On application to one of Her Majesty's principal Secretaries of State by the nuisance authority of the City of London, or any district or parish included within the Act for the Better Local Government of the Metropolis, or of any municipal borough, or of any place under the Local Government Act, 1858, or any local improvement Act, or of any city or town containing, according to the census for the time being in force, a population of not less than 5000 inhabitants, the Secretary of State may, as he may think fit, by notice to be published in the *London Gazette*, declare the following enactment to be in force in the district of such nuisance authority, and from and after the publication of such notice the nuisance authority shall be empowered to make regulations for the following matters; that is to say :—

(1) For fixing the number of persons who may occupy a house or part of a house which is let in lodgings or occupied by members of more than one family :
(2) For the registration of houses thus let or occupied in lodgings :
(3) Por the inspection of such houses, and the keeping the same in a cleanly and wholesome state :
(4) For enforcing therein the provision of privy accommodation and other appliances and means of cleanliness in proportion to the number of lodgings and occupiers, and the cleansing and ventilation of the common passages and staircases :

(5) For the cleansing and lime-whiting at stated times of such premises:

The nuisance authority may provide for the enforcement of the above regulations by penalties not exceeding forty shillings for any one offence, with an additional penalty not exceeding twenty shillings for every day during which a default in obeying such regulations may continue; but such regulations shall not be of any validity unless and until they shall have been confirmed by the Secretary of State.

But this section shall not apply to common lodging-houses within the provisions of the Common Lodging-houses Act, 1851, or any Act amending the same.

Cases in which Two Convictions have occurred within Three Months.

Section 36.—Where two convictions against the provisions of any Act relating to the overcrowding of a house, or the occupation of a cellar as a separate dwelling-place, shall have taken place within the period of three months, whether the persons so convicted were or were not the same, it shall be lawful for any two justices to direct the closing of such premises for such time as they may deem necessary, and in the case of cellars occupied as aforesaid, to empower the nuisance authority to permanently close the same in such manner as they may deem fit, at their own cost.

THE ARTISANS' AND LABOURERS' DWELLINGS ACT, 1868.
(31 & 32 Vict. c. 130.)

Premises in a Condition unfavourable to Health.

Section 5.—If in any place to which this Act applies the *officer of health* finds that any premises therein are in a condition or state dangerous to health, so as to be unfit for human habitation, he shall report the same in the manner hereinafter provided to the local authority.

Section 6.—Every report made under this Act by the officer of health shall be made in writing and delivered to the clerk of the local authority, and the local authority shall refer such report to a surveyor or engineer, who shall thereupon consider the report so furnished to him, and report

to the local authority what is the cause of the evil so reported on, and the remedy thereof, and, if such evil is occasioned by defects in any premises, whether the same can be remedied by structural alterations and improvements, or otherwise, or whether such premises, or any and what part thereof, ought to be demolished.

He is directed to act under this clause on official information, that is to say, on the information supplied by his own inspector of nuisances; but he would not be safe in ignoring information which might reach him from any other persons, or which might become personally known to him. If he should obtain information on the two subjects referred to in the clause, he should take the action prescribed; but however he might justify neglect of such information, he must act on the receipt of information supplied by the inspector.

The subjects referred to are nuisances injurious to health and overcrowding in a house. The former has been sufficiently referred to under former paragraphs, but it will be well to again notice the limits of his action, viz. not a nuisance merely, but a nuisance injurious to health, and whatever may be the opinion of the inspector of nuisances, or of any other person, it will be his duty to act upon his own decision as to whether it is injurious to health. It moreover appears from the wording of the clause that proof must exist that it is injurious to health, and therefore action can scarcely be taken until ill-health or sickness has arisen, and in his opinion has been due to the nuisance. The words are not, "threaten to affect injuriously the public health," as in No. 1, but, "any nuisance injurious to health."

The subject of overcrowding is one of as much difficulty in treatment as importance, and particularly in towns. The

term "overcrowding" is not limited to mere convenience, or even social propriety, but has special reference to health, and should be understood to be overcrowding in a degree injurious to health. The meaning of the word has not been determined by the Legislature, but so far as relates to metropolitan lodging-houses, there must be 30 feet of floor space, and 240 cubical feet of air space for each inmate, and any quantity less than that would indicate overcrowding. The space required by the Emigration Commissioners on emigrant ships is fifteen superficial feet for each person, and a height of not less than six feet, and the hospital accommodation is reckoned in even this extremely limited space.

The question of overcrowding in a particular house must depend upon the position, surroundings, and construction of the house; for an ill-ventilated dwelling in a closed court in a town would clearly be overcrowded in the sense of injury to health with a smaller number of inmates than a house having the same cubical capacity under more favourable sanitary conditions. For the same reason a house which has been materially improved by ventilation might be no longer overcrowded in that sense, or might admit an increased number of inmates.

The steps which may be taken are defined by statute, but he is entitled to take only such steps as the circumstances of the case may justify and require. He is not the only person who may have to determine whether in a particular case the circumstances do justify and require certain steps; but he is one of them, and his opinion will have much weight, although it may be challenged, and he is entitled to act upon his opinion so long as he is within the statutes.

CHAPTER IV.

FOOD UNFIT FOR THE USE OF MAN.

8. IN ANY CASE IN WHICH IT MAY APPEAR TO HIM TO BE NECESSARY OR ADVISABLE, OR IN WHICH HE SHALL BE SO DIRECTED BY THE SANITARY AUTHORITY, HE SHALL HIMSELF INSPECT AND EXAMINE ANY ANIMAL, CARCASS, MEAT, POULTRY, GAME, FLESH, FISH, FRUIT, VEGETABLES, CORN, BREAD, OR FLOUR, EXPOSED FOR SALE, OR DEPOSITED FOR THE PURPOSE OF SALE OR OF PREPARATION FOR SALE, AND INTENDED FOR THE FOOD OF MAN, WHICH IS DEEMED TO BE DISEASED, OR UNSOUND, OR UNWHOLESOME, OR UNFIT FOR THE FOOD OF MAN; AND IF HE FINDS THAT SUCH ANIMAL OR ARTICLE IS DISEASED, OR UNSOUND, OR UNWHOLESOME, OR UNFIT FOR THE FOOD OF MAN, HE SHALL GIVE SUCH DIRECTIONS AS MAY BE NECESSARY FOR CAUSING THE SAME TO BE SEIZED, TAKEN, AND CARRIED AWAY, IN ORDER TO BE DEALT WITH BY A JUSTICE ACCORDING TO THE PROVISIONS OF THE STATUTES APPLICABLE TO THE CASE.

IT is interesting to note the recent progress of legislation on the subject of the inspection of food from the Markets' and Fairs' Clauses Act, and the Towns' Improvement Clauses Act of 1847, to the Nuisances' Removal Act for England Amendment Act of 1863, which contains the words now quoted in this clause.

The Markets' and Fairs' Clauses Act, 1847.
(10 & 11 Vict c. 14.)

Section 15.—Every person who shall sell or expose for sale any *unwholesome meat or provisions* in the market or fair shall be liable to a penalty not exceeding five pounds for every such offence;

And any inspector of provisions appointed by the undertakers may seize such *unwholesome meat and provisions*, and carry the same before a justice, and thereupon such proceedings shall be had as are hereinafter directed to be had in the case of any *cattle or carcass* seized in any slaughter-house, and carried before a justice;

And every person who shall obstruct or hinder the inspector of provisions from seizing or carrying away such *unwholesome meat or provisions* shall be liable to a penalty not exceeding five pounds for every such offence.

The Towns' Improvement Clauses Act, 1847.
(10 & 11 Vict. c. 34.)

Section 137.—*The inspector of nuisances, the officer of health, or any other officer* appointed by the commissioners for that purpose, may at all reasonable times, with or without assistants, enter into and inspect any building or place whatsoever within the said limits kept or used for the sale of butcher's meat, or for slaughtering cattle, and examine whether any cattle or the carcass of any such cattle is deposited there, and in case such officer shall find any cattle or the carcass, or part of the carcass, of any beast which appears *unfit for the food of man*, he may seize and carry the same before a justice, and such justice shall forthwith order the same to be further inspected and examined by competent persons;

And in case upon such inspection and examination such *cattle, carcass*, or *part of a carcass*, be found to be *unfit for the food of man*, such justice shall order the same to be immediately destroyed, or otherwise disposed of in such a way as to prevent the same being exposed for sale or used for the food of man;

And such justice may adjudge the person to whom such *cattle*, *carcass*, or *part of a carcass*, belongs, or in whose custody the same is found, to pay a penalty not exceeding ten pounds for every such *animal*, or *carcass*, or *part of a carcass* so found;

And the owner or occupier of any building or place kept or used for the sale of butcher's meat, or for slaughtering cattle, and every other person who obstructs or hinders such inspector or other officer from entering into and inspecting the same, and examining, seizing, or carrying away any such *animal*, or *carcass*, or *part of a carcass*, so appearing to be unfit for the food of man, shall be liable to a penalty not exceeding five pounds for each offence.

The Public Health Act, 1848.

(11 & 12 Vict. c. 63.)

Section 63.—And be it enacted that the *inspector of nuisances* may be and he is hereby empowered at all reasonable times, with or without assistants, to enter into and inspect any shop, building, stall, or place kept or used for the sale of butcher's meat, poultry, or fish, or as a slaughter-house, and to examine any *animal*, *carcass*, *meat*, *poultry*, *game*, *flesh*, *or fish*, which may be therein;

And in case any *animal*, *carcass*, *meat*, *poultry*, *game*, *flesh*, *or fish*, appear to him to be intended for the food of man, and to be unfit for such food, the same may be seized;

And if it appear to a justice, upon the evidence of a competent person, that any such *animal*, *carcass*, *meat*, *poultry*, *game*, *flesh*, *or fish*, is unfit for the food of man, he shall order the same to be destroyed, or to be so disposed of as to prevent its being exposed for sale or used for such food;

And the person to whom such *animal*, *carcass*, *meat*, *poultry*, *game*, *flesh*, *or fish*, belongs, or in whose custody the same is found, shall be liable to a penalty not exceeding ten pounds for every *animal*, or *carcass*, *fish*, or piece of *meat*, *flesh*, or *fish*, or any *poultry*, or *game*, so found, which penalty may be recovered before two justices in the manner hereinafter provided with respect to penalties the recovery whereof is not expressly provided for.

THE NUISANCES' REMOVAL ACT FOR ENGLAND, 1855.

(18 & 19 Vict. c. 121)

3. To remove or abate a nuisance, in case of non-compliance with or infringement of the order of justices, or to inspect or examine any *carcass, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour*, under the powers and for the purposes of this Act.

For this purpose the local authority, or their officer, may from time to time enter the premises where the nuisance exists, or the *carcass, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour*, is found, at all reasonable hours, or at all hours during which business is carried on on such premises without notice.

THE NUISANCES' REMOVAL ACT FOR ENGLAND AMENDMENT ACT, 1863.

(26 & 27 Vict. c. 117.)

Section 2.—The *medical officer of health*, or inspector of nuisances, may at all reasonable times inspect and examine any *animal, carcass, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, or flour*, exposed for sale, or deposited in any place for the purposes of sale or of preparation for sale, and intended for the food of man—the proof that the same was not exposed or deposited for such purpose or purposes, or was not intended for the food of man, resting with the party charged;

And in case any such animal, *carcass, meat, poultry, game, flesh, fruit, vegetables, corn, bread, or flour*, appear to him to be *diseased*, or *unsound*, or *unwholesome*, or *unfit for the food of man*, it shall be lawful for such medical officer of health or inspector of nuisances to seize, take, and carry away the same, or direct the same to be seized, taken, and carried away by any officer, servant, or assistant, in order to have the same dealt with by a justice;

And if it shall appear to the justice that any such animal, or any of the said articles, is *diseased*, or *unsound*, or *unwholesome*, or *unfit for the food of man*, he shall order the same to be destroyed or so disposed of as to prevent such

animal or *articles* from being exposed for sale or used for such food;

And the person to whom such *animal*, *carcass*, *meat*, *poultry*, *game*, *flesh*, *fish*, *fruit*, *vegetable*, *corn*, *bread*, or *flour*, belongs or did belong at the time of sale or of exposure for sale, or in whose possession or on whose premises the same is found, shall, upon conviction, be liable to a penalty not exceeding twenty pounds for every *animal*, *carcass*, or *fish*, or piece of *meat*, *flesh*, or *fish*, or any *poultry* or *game*, or for the parcel of *fruit*, *vegetables*, *corn*, *bread*, or *flour* so found, or at the discretion of the justice, without the infliction of a fine, to imprisonment in the common gaol or house of correction for a term of not more than three calendar months.

Section 3.—In case any person shall in any manner prevent such medical officer of health or inspector of nuisances from entering any slaughterhouse, shop, building, market or other place where such animal, carcass, meat, poultry, or fish is kept for the purpose of sale or of preparation for sale, or shall in any manner obstruct or impede him, or his servant, or assistant, when duly engaged in carrying the provisions of this Act into execution, such person shall be liable to a penalty not exceeding five pounds.

The action to be taken under this clause is consequent only upon his own knowledge, and the direction of the sanitary authority. In the former case, he is allowed great discretion, for the words are, "In any case in which it may appear to him to be necessary or advisable," and it is desirable that he should duly weigh both the necessity and the advisability; but the direction of the nuisance authority leaves him no discretion, and he must proceed to discharge the duty imposed upon him. The duty itself can be discharged only by himself, and on his personal inspection and examination; but it may be at his own house, or elsewhere. The articles to be inspected are defined to be any animal, carcass, meat, poultry, game, flesh, fish, fruit, vege-

tables, corn, bread, or flour, and include many of the most important foods of man, but exclude many others, as eggs.

There are several limitations to which particular reference should be made. Thus—

1. They are limited to the use of man;
2. They must be exposed for sale, or deposited for the purpose of sale or of preparation for sale;
3. They must be deemed to be diseased, or unsound, or unwholesome, or unfit for the food of man;
4. He can act only if he finds them to be so diseased, unsound, or unwholesome, or unfit for the food of man.

It seems therefore that food of the qualities referred to, and which may be presumed to be injurious to health, may be kept for private consumption, or given to any one, and the medical officer cannot take action thereon, provided it be not intended or offered for sale. It is probable that this may be an inconvenient abridgement of power, and may also lead to difficulty in proving the fact as to the intended sale.

Before the medical officer will be justified in seeking to inspect and examine, there must be reasonable ground for the belief that the food is unfit for the use of man, for the phrase, "deemed to be diseased," &c. must imply a presumption that it is so. The four qualifications are, however, distinct, and each may be acted upon alone if he finds "such animal or article is diseased, or unsound, or unwholesome, or unfit for the food of man." Yet it is probable, from the scope of the whole Order, that the last is the true qualification, and the clause should be held to mean diseased, or

unsound, or unwholesome, or otherwise unfit for the food of man.

An animal must mean a living animal, and it must be only such as is intended for sale as food for man. It may have two conditions which demand attention during life in anticipation of its use as the food of man, viz. an infectious local disease, and a state of general disease, by which the flesh would be rendered unfit for the food of man. Measly pork consists of a number of vesicles between the muscles, which contain the *Cysticercus cellulosæ*. Hence the duty assigned to the medical officer is most important in its relations to public health.

The influence of non-infectious diseases in animals as causing food to be unfit for the use of man will give rise to much difference of opinion. It does not follow that, because the animal is diseased, the flesh will be unwholesome, as, for example, an acute inflammation of a vital organ, or a cow which has burst its stomach through eating an excess of clover, or an animal dying in a fit, or the result of an injury soon preceding the death. Braxy mutton is eaten daily in the highlands of Scotland, and no evil results having been traced to its use, it is held universally to be a good food—yet the sheep died, and was not killed.

It is probable that a long continued disease, or a disease of the general system, may so affect the flesh as to render it unwholesome, whilst an acute disease, ending in a few hours, would not alter the character of the flesh in an appreciable degree, and it is customary, in the latter state, to kill the animal, and to eat it, rather than allow it to die naturally. If an animal which has any kind of disease is held to be unfit for the food of man, although not dying naturally, much

valuable food will be lost, and it is probable that medical officers will exercise a reasonable discretion in the particular cases as they come under their inspection.

Carcass meat and flesh may be considered together, and the evidence of disease and unsoundness should be known, as well as the indications which show it to be unwholesome or unfit for the food of man. It is clear that mere thinness of flesh, due to deficient food, cannot be so regarded, for the flesh, although deficient in fat and juices, is not diseased, and can be regarded only as poor flesh, to be sold at a less price than meat in ordinary condition.

Flesh which is pale, flabby, and wet, has the character of unsound and unwholesome meat; and when it is unusually dark-coloured, it implies some impediment to respiration before death, or that the animal had not been killed by bleeding. There is also sometimes a faint and unnatural odour, which will aid to indicate the diseased character of flesh.

Special organs, as the lungs and liver, may be in a state of disease, which unfits them for the food of man, whilst the flesh may be sound and wholesome.

It is very desirable that the strictest watch should be held over meat which is really unwholesome and unfit for the food of man; but injustice should not be done to producers, nor an undue burden laid on the poor as consumers, and no meat should be rejected which is not clearly diseased and unwholesome.

Poultry, game, and fish are rejected almost invariably because decomposition has set in, and the meat is thereby held to be unwholesome. This is determined both by the appearance and the smell, and offers less difficulty than the

determination of the effects of disease. As decomposition begins immediately after death, and as game and even flesh are held by many to be improved by it, it is necessary to act with discretion, and not regard every indication of decay as proof that the food is unfit for the use of man. There is, however, a limit which is well understood by both seller and buyer, beyond which the meat is not regarded as wholesome, and it will be the duty of the medical officer to recognise it. Fish, however, is never kept with this view, and when it has changed colour, and has an ammoniacal odour, it is not or will soon be not fit for food.

Fruit and vegetables show their unsoundness by means of decay, and the degree to which that extends will indicate its unfitness for food. When the portion which is decayed is not considerable, it may be cut away, and the sound part eaten; but when it is considerable, the whole should be destroyed. Vegetables, however, may shrink or shrivel, and become dry, in which state they are less agreeable and useful as food, but are not unwholesome.

The meaning of the word corn will remain for determination as to whether it includes all grain, or the cereals for the use of man and animals, or only a particular grain called maize or Indian corn. The last is the meaning of the word in some other countries; but in England it is customary to give it a wider signification, and to include the cereals, as wheat, maize, rye, oats, and barley. The diseased corn with which we are the best acquainted is that of rye, or the *Secale cornutum*, which has been known to produce terrible effects when eaten as bread.

Unsoundness is, however, well known, and, in fact, unsound wheat is constantly in our market. It is due to the germi-

nation or sprouting of the grain, by which a portion of the starch is destroyed. The young shoot is evident to the naked eye, and reveals the condition of the grain; but it will yet remain to prove that such grain is not fit for the food of man. So far as our knowledge extends, it is still fit for food, although its food qualities are deteriorated, and its commercial value is proportionately reduced.

The term flour is generally held to mean the ground grain of wheat, whilst the ground grain of oats, rye, and barley, is known as meal. The only questions which arise on this food are its soundness and purity, and although the words, "or fit for the food of man," would probably carry the question of adulteration, such does not appear to have been the object of the Order, for the medical officer of health will not necessarily be the analyst. Unsound flour as ordinarily seen cannot be said to be unfit for the food of man. In its action in the production of bread it absorbs less water than sound flour, and renders both bread and puddings soft, and the flavour is less agreeable. Hence it is called weak, and is usually mixed with strong flour—that is, with flour made from wheat grown in hot seasons or hot climates, and containing a larger proportion of nitrogen.

The action which he may take in dealing with diseased or unsound or unwholesome food, or food unfit for the use of man, is limited to a discretion to have it seized and conveyed before a justice, who alone is competent to decide upon its character. Hence he should have it brought before the magistrate at the earliest moment, and, as far as may be possible, in the state in which he seized it; and as changes will frequently occur, he should be prepared by his

carefully taking notes at the time, or the testimony of others, to prove its actual state at the time of seizure. He should also see that it is in safe custody, so that its identity cannot be reasonably doubted. Hence there should be a well-ventilated and convenient place in connection with his office in which such articles may be deposited.

Before concluding this chapter, it may be useful to refer the reader to Dr. Letheby's valuable remarks on this subject in his work on Food, because his experience and chemical knowledge as a medical officer of health are almost unrivalled. After referring to the meat of animals suffering from smallpox and virulent spotted fever of the nature of typhus, he adds, "I feel that the question of the fitness of such meat for food is in such an unsettled state that my action in the matter is often very uncertain, and I should like to have the question experimentally determined; for as it now stands, we are either condemning large quantities of meat which may be eaten with safety, and are therefore confiscating property and lessening the supply of food, or we are permitting unwholesome meat to pass almost unchallenged in the public markets."

CHAPTER V.

OFFENSIVE PROCESSES OF TRADE.

10. HE SHALL ENQUIRE INTO ANY OFFENSIVE PROCESS OF TRADE CARRIED ON WITHIN HIS DISTRICT, AND REPORT ON THE APPROPRIATE MEANS FOR THE PREVENTION OF ANY NUISANCE OR INJURY TO HEALTH THEREFROM.

THE trades which are offensive or dangerous are very numerous, and although within the district assigned to any medical officer of health they may be few, it is desirable that they should be known to him. The following is a list of those pursued in France, with the cause of complaint assigned to each; but no such list has been prepared of English manufactories. So far as the same trades are carried on in the two countries, one may suffice, but there are doubtless some in England which are not found in France, and it will be desirable for the medical officer of health, as well as his inspector of nuisances, to add such as may be in operation in their several localities. It is probable that but little difficulty will arise in determining such as are offensive, but it may be very difficult to suggest "appropriate means for the prevention of any nuisance or injury to health therefrom."

DANGEROUS, NOXIOUS, OR OFFENSIVE TRADES.

(No. 46.)

ARRANGEMENT OF WORKS IN FRANCE, 1867.

FIRST CLASS.

Names of Manufactures.	Cause of Complaint.
Acid, arsenic (manufacture of).	
By means of arsenious acid and nitric acid.	
When the nitrous products are not absorbed . . .	Injurious emanations.
——, hydrochloric (production of).	
By the decomposition of the chloride of magnesium, of aluminium, &c.	
When the acid is not condensed .	Do.
——, oxalic (manufacture of).	
By nitric acid.	
Without destruction of injurious gases	Fumes.
——, picric.	
When the injurious gases are not burnt	Injurious vapours.
——, stearic (manufacture of).	
By distillation	Smell and danger of fire.
——, sulphuric (manufacture of).	
By the combustion of sulphur and pyrites	Injurious emanations.
Acids (refining of gold and silver by) .	Do.
Aldehyde (manufacture of) . . .	Danger of fire.
Archil (manufacture of).	
In open vessels	Smell.
Blood.	
Workshops for separating fibrine, albumen, &c.	Do.
Dépôts of, for the manufacture of Prussian blue and other industrial products	Do.
Manufacture of powder of, for clarifying wines	Do.

FIRST CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Bone fat (manufacture of) . . .	Smell; pollution of waters; danger from fire.
Bones (torrefaction of) for manure.	
When the gases are not burnt . .	Smell and danger of fire.
——, fresh (dépôts of, on large scale) .	Smell; injurious emanations.
Bristles of swine (preparation of).	
By fermentation	Smell.
Burning of marine plants in permanent establishments	Smell and smoke.
Carbonising of animal matters in general	Smell.
Carriage grease	Smell; danger from fire.
Chrysalides (workshop for extracting the silk)	Smell.
Coke (manufacture of).	
In the open air, or in kilns not smoke-consuming	Smoke and dust.
Cyanide of potassium and Prussian blue (manufacture of).	
By the direct calcining of animal matters with potash . . .	Smell.
Dogs (infirmaries for)	Smell and noise.
Ether (manufacture and dépôts of). .	Danger from fire and explosion.
Fat in the naked flame (melting of) .	Smell; danger of fire.
—— or thick oil, for the use of chamois leather dressers and curriers (manufacture of)	Do. do.
—— varnish (manufacture of) . .	Do. do.
Fatty waters (extraction of the oils contained in) for the manufacture of soap and other purposes.	
In open vessels	Do. do.
Felts and patent shades (manufacture of) .	Do. do.
Fireworks (manufacture of) . . .	Danger from fire and explosion.
Flesh, débris, and offal (dépôts of), arising from the slaughter of animals . .	Smell.

FIRST CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Fulminating mercury (manufacture of) .	Danger of fire and explosion.
Glue (manufacture of)	Smell; pollution of water.
Greaves (manufacture of) . . .	Smell and danger of fire.
Guano (dépôts of).	
When the quantity exceeds 25,000 *kilogrammes*	Smell.
Gut manufactures (working of fresh intestines for all purposes) . . .	Smell; injurious emanations.
Ivory black and animal charcoal (distillation of bones or manufacture of).	
When the gases are not burnt . .	Smell.
Lignites (incineration of) . . .	Smoke; injurious emanations.
Manures (dépôts of) from middens.—Animal remains.	
Not prepared or in uncovered stores .	Smell.
—— (manufacture of).	
By means of animal matters . .	Do.
Matches (manufacture of).	
With detonating and explosive substances	Danger of explosion and fire.
——, quick (manufacture of).	
With explosive materials . . .	Do. do.
Menageries	Danger from animals.
Mud and impurities (dépôts of), and sewers	Smell.
Nightsoil, desiccated, and other manures from animal matters (manufacture of) .	Smell and pollution of water.
Nitrate of iron (manufacture of).	
When the injurious vapours are not absorbed or decomposed . .	Injurious emanations.
Oil, fish (manufacture of) . . .	Smell; danger of fire.

FIRST CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Oil, neatsfoot (manufacture of).	
With employment of matters in putrefaction	Smell; danger of fire.
Oils and other fatty bodies extracted from the remains of animal matters (extraction of)	Do. do.
—— (mixed, hot or boiled).	
In open vessels	Do. do.
—— of petroleum and other hydrocarbons (cleaning of tissues and waste wool by)	Danger of fire.
—— of petroleum, of schist, and of tar and other hydrocarbons employed for lighting, heating, manufacture of colours and varnishes, the cleaning of cloths, and other purposes.	
Manufacture, distillation, and work on a great scale	Smell; danger of fire.
Very inflammable substances, that is to say, emitting vapours liable to take fire at a temperature of less than 35 *degrees.*	
If the quantity stored is, even temporarily, 1050 *litres or more*	Do. do.
Less inflammable substances, that is to say, emitting vapours liable to take fire, at a temperature of 35 *degrees and above.*	
If the quantity stored is, even temporarily, 10,500 *litres or more*	Do. do.
——, red (manufacture of).	
By the extraction of greaves and fatty remnants, at a high temperature :	Do. do.
——, resinous (manufacture of) . .	Do. do.
Olive-oil cakes (preparation of).	
By sulphuret of carbon . . .	Danger from fire.
Patent leather (manufacture of) . .	Smell and danger of fire.
Pearl ashes.	
With discharge of fumes outside .	Smoke and smell.
Phosphorus (manufacture of). . .	Danger of fire.
Piggeries	Smell; noise.

FIRST CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Potash, arseniate of (manufacture of).	
By means of saltpetre.	
When the vapours are not absorbed	Injurious emanations.
Powder and fulminating substances (manufacture of)	Danger of explosion and fire.
Powders, explosive (manufacture of) .	Danger of explosion.
Printing ink (manufacture of) . .	Smell; danger of fire.
Pyritous and aluminous earths (roasting of)	Smoke; injurious emanations.
Red, Prussian and English . . .	Injurious emanations.
Resins, gallipot and common resin (work on a large scale for melting and purifying)	Smell and danger of fire.
Retting in quantity, hemp and flax . .	Injurious emanations and pollution of water.
Sabots (workshop for smoking).	
By the combustion of the horn or other animal matters, in the towns .	Smell and smoke.
Scalding-houses.	
For the industrial preparation of animal remains	Smell.
Skinning of animals	Smell; injurious emanations.
Slaughterhouses, public . . .	Smell and tainting of water.
Soda, raw, from sea-weed (manufacture of).	
In permanent establishments . .	Smell and smoke.
Starch-works.	
By fermentation	Smells, injurious emanations, and pollution of water.
Sulphate of ammonia (manufacture of).	
By distillation of animal matters .	Smell.
—— of copper (manufacture of).	
From roasting pyrites . . .	Injurious emanations.
—— of mercury (manufacture of).	
When the vapours are not absorbed .	Do.
—— of soda (manufacture of).	
By the decomposition of common salt by sulphuric acid, without condensation of the hydrochloric acid .	Do.

FIRST CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Sulphuret of carbon (manufacture of) .	Smell; danger of fire.
—— (manufactures in which they employ on a large scale the)	Danger of fire.
Sulphurous minerals (roasting of) . .	Smoke; injurious emanations.
Taffeta and glazed or waxed cloth (manufacture of)	Smell; danger of fire.
Tallow, brown (manufacture of) . .	Do. do.
—— candles (melting-houses for).	
Using naked flame	Do. do.
Tarpaulings (manufacture of).	
By using oil	Danger of fire.
Tars (special processes for the boiling of).	
From various sources . . .	Smell; danger from fire.
—— and vegetable resins (elaboration of).	
From various sources . . .	Do. do.
Tobacco (calcination of the midribs of) .	Smell and smoke.
Triperies annexed to the slaughterhouses	Smell and pollution of water.
Turf (charring of).	
In open vessels	Smell and smoke.

SECOND CLASS.

Names of Manufactures.	Cause of Complaint.
Acid, arsenic (manufacture of).	
By means of arsenious acid and nitric acid.	
When the nitrous products are absorbed	Injurious vapours.
——, hydrochloric (production of).	
By the decomposition of the chloride of magnesium, of aluminium, &c.	
When the acid is condensed .	Accidental emanations.
——, oxalic (manufacture of).	
By sawdust and potash . . .	Vapour.
——, pyroligneous (manufacture of).	
When the gaseous products are not burned	Smoke and smell.
——, pyroligneous (purification of) .	Smell.
——, stearic (manufacture of).	
By saponifying	Smell and danger of fire.
Alcohol (rectification of)	Danger of fire.
Alkaline chlorides, eau de javelle (manufacture of)	Smell.
Animal charcoal from refineries and sugar works (revivification of) . . .	Injurious emanations ; smell.
Arseniate of potash (manufacture of).	
By saltpetre.	
When the vapours are absorbed .	Accidental emanations.
Artificial fuel or bricks of coal (manufacture of).	
With fat resin	Smell ; danger of fire.
Asphalts and bitumens (working of).	
By the naked fire	Do. do.
Baryta (decolorising of sulphate of).	
By hydrochloric acid in open vessels .	Injurious emanations.
Bleaching.	
Of yarns, of cloths, and of pulp for paper by chlorine	Smell ; injurious emanations.
Of yarns and woollen fabrics, and silks, by sulphurous acid . . .	Do. do.

SECOND CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Bones (torrefication of) for manure .	Smell and danger of fire.
When the gases are burnt . . .	Do. do.
Carbonisation of woods.	
In the open air, in permanent establishment, and otherwise than in the forest	Smell and smoke.
In close vessels, disengaging into the air the gaseous products of distillation	Do. do.
Carpet-beating on a large scale . .	Noise and dust.
Chamois leather factories . . .	Smell.
Chlorine (manufacture of).	
On a large scale	Do.
Cocoons.	
Treatment of coloured cocoons . .	Pollution of water.
Spinning of cocoons (see *Cocoons*, Class III.)	
Coke (manufacture of).	
In smoke-consuming kilns . .	Dust.
Cooperage on a large scale.	
Working on casks impregnated with fatty and putrescent matters . .	Noise, smell, and smoke.
Crockery (manufacture of).	
With kilns not smoke-consuming .	Smoke.
Currying works	Smell.
Cyanide of potassium and Prussian blue (manufacture of).	
By employing matters previously carbonised in close vessels . . .	Do.
Dairies on a large scale, in the towns .	Do.
Enamelled earths (manufacture of).	
With kilns not smoke-consuming .	Smoke.
Engines and waggons (workshops for construction of)	Noise ; smoke.
Fatty waters (extraction for the manufacture of soap, and other uses of oils contained in).	
In close vessels	Smell ; danger of fire.

SECOND CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Felt, tarred (manufacture of) . .	Smell; danger of fire.
Forges and boilerworks for great works employing machine hammers . .	Smoke; noise.
Furnaces, blast	Smoke and dust.
Gases for lighting and firing (manufacture of)	Smell.
For the public use	Smell, and danger of fire and explosion.
Glassworks, crystalworks, and manufactures of mirrors.	
In kilns not smoke-consuming . .	Smoke and danger of fire.
Hairs and pigs' bristles (preparation of).	
Without fermentation (see also *Bristles, by fermentation*, Class I.)	Smell.
Indiarubber (working of).	
Employing essential oils or sulphuret of carbon	Smell; danger of fire.
——, (application of coatings of) . .	Danger of fire.
Ivory and animal black (distillation of bones or manufacture of).	
When the gases are burnt . .	Smell.
Laces and cloths of gold and silver (burning on a great scale of), in the towns	Do.
Lamp black (manufacture of).	
By the distillation of oils, tars, bitumens, &c.	Smoke; smell.
Leather, raw, and fresh hides (dépôts of)	Smell and dust.
Lime-kilns.	
Permanent	Smoke; dust.
Manures (dépôts of) from middens.—Animal remains.	
Dried or disinfected, and in covered stores when the quantity exceeds 25,000 *kilogrammes* . . .	Smell.

SECOND CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Murexide (manufacture of). *In close vessels, by the reaction of nitric acid, and of the uric acid of guano.*	Injurious emanations.
Nitro-benzine, aniline, and matters derived from benzole (manufacture of) . .	Smell, injurious emanations, and danger of fire.
Oil, neatsfoot (manufacture of). *When the matters employed are not putrefied*	Smell.
Oilcloths for packing cloth, tarred cords, tarred papers, pasteboards, and bituminous tubes (manufacture of). *By hot method*	Smell and danger of fire.
Oils (burning). *When alcohol and essential oils are used*	Danger of fire and explosion.
—— (mixing by heat or boiling of). *In close vessels*	Smell and danger of fire.
—— of petroleum, of schist, and of tar, light oils, and other hydrocarbons employed in lighting and heating and in the manufacture of colours and varnishes, cleaning stuffs, &c. *Very inflammable substances, that is to say, emitting vapours liable to take fire at a temperature of less than 35 degrees (or 95° Fahr.) on approach of a lighted match.* *If the quantity above 150 litres does not reach 1050 litres* .	Do. do.
Less inflammable substances, that is to say, emitting vapours liable to take fire only at a temperature of 35 degrees and above. *If the quantity stored above 1050 litres does not reach 10,500 litres*	Do. do.
Onions (drying of), in the towns . .	Smell.
Parchment factories	Do.

SECOND CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Pearl ashes.	
With combustion and condensation of the smoke	Smoke and smell.
Plaster (kilns for).	
Permanent	Smoke and dust.
Porcelain (manufacture of) . . .	Smoke.
Potash (manufacture of).	
By carbonising the residue of molasses	Smoke and smell.
Protochloride, or salt of tin (manufacture of)	Injurious emanations.
Resinous torches (manufacture of) . .	Smell and danger of fire.
Retting (on a great scale) of hemp and flax.	
By the action of acids, of warm water, and of vapour	Injurious emanations and pollution of water.
Rogue (dépôt of brine used for salting) .	Smell.
Sal ammoniac and sulphate of ammonia (manufacture of).	
By employing animal matters . .	Smell; injurious emanations.
——, extracted from the waters of gas-works (special manufacture of) . .	Smell.
Salt provisions (establishments for) and smoking of fish.	Do.
Salted fish (dépôts of)	Unpleasant smell.
Sardines (preparation of preserved), in the towns	Smell.
Sausages (manufactures on a great scale of)	Do.
Silk hats or other preparations, by means of a finish (manufacture of) . .	Danger of fire.
Skins or fur of hares and rabbits (cleaning of)	Smell.
Slaughterhouses	Smell and danger from the animals.
Starch-works.	
By the separation of the gluten, and without fermentation . . .	Pollution of water.
Stripping of flax, hemp, and jute on large scale	Dust and smoke.

SECOND CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Sugar refinery and manufacture . .	Smoke and smell.
Sulphate of mercury (manufacture of).	
When the vapours are absorbed. . .	Slight emanations.
—— of peroxide of iron (manufacture of).	
By sulphate of protoxide of iron and nitric acid (nitrosulphate of iron) .	Injurious emanations.
—— of soda (manufacture of).	
With complete condensation of the hydrochloric acid. . . .	Do.
Sulphur (fusion or distillation of) . .	Injurious emanations; danger from fire.
Tallow candles (smelting-houses for).	
In the water-bath or by steam . .	Smell.
Tanneries	Do.
Tarpaulings (manufacture of).	
Without boiling in oil	Danger of fire.
Tars (treatment of) in gas manufactures .	Smell and danger of fire.
—— and bituminous fluid matters (dépôts of)	Do. do.
Tobacco (manufacture of) . . .	Smoke and dust.
—— pipes (manufacture of).	
With kilns not smoke-consuming .	Smoke.
Turf (carbonisation of).	
In close vessels	Smell.
Varnish (manufactures of).	
With spirits of wine	Smell and danger of fire.

THIRD CLASS.

Names of Manufactures.	Cause of Complaint.
Acid, nitric	Injurious emanations.
——, oxalic (manufacture of).	
By nitric acid.	
With destruction of injurious gases	Accidental fumes.
——, picric.	
With destruction of injurious gases	Injurious vapours.
——, pyroligneous (manufacture of).	
When the gaseous products are burned	Smoke and smell.
——, sulphuric (manufacture of).	
Of Nordhausen, by the decomposition of sulphate of iron	Injurious emanations.
Albumen (manufacture of).	
From the fresh serum of blood	Smell.
Alcohols other than from wine.	
Without works for rectification	Pollution of water.
—— (agricultural distillery)	Do.
Ammonia (manufacture on a large scale of).	
By the decomposition of ammoniacal salts	Smell.
Ammoniacal cochineal (manufacture of)	Do.
Archil (manufacture of).	
In close vessels, and employing ammonia to the exclusion of urine	Do.
Artificial fuel or bricks of coal (manufacture of).	
With dry resin	Do.
Asphalts, bitumens, resins, and bituminous solid matters (dépôts of)	Smell; danger of fire.
Bacon (workplaces for smoking)	Smell and smoke.
Bark beaters in the towns	Noise and dust.
Bleaching.	
Linen threads and tissues, hemp and cotton, by the alkaline chlorides (hypochloride)	Smell; pollution of water.
Breweries	Smell.
Brickworks.	
With kilns not smoke-consuming	Smoke.
Button makers and other metal embossers by mechanical means	Noise.

THIRD CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Candles and other articles in wax and stearic acid	Danger of fire.
—— (manufacture of)	Smell; danger of fire.
—— of paraffin and others of mineral origin (moulding of)	Do. do.
Carbonising wood.	
In close vessels, with combustion of the gaseous products of distillation	Smell and smoke.
Ceruse, or white lead (manufacture of)	Injurious emanations.
Cheeses (dépôts of), in the towns	Smell.
Chloride of lime (manufacture of).	
In works manufacturing at most 300 *kilogrammes per day*	Do.
Chromate of potash (manufacture of)	Do.
Coal-washing	Pollution of water.
Cocoons (spinning of).	
Workshops on a large scale, that is to say, employing at least six winders.	Smell; pollution of water.
Coffee (roasting on a large scale of)	Smell and smoke.
Copper (solution of).	
By acids	Smell; injurious emanations.
Cotton and greased cotton (bleaching waste of)	Pollution of water.
—— waste (dépôts of).	
On a large scale, in the towns	Danger of fire.
Cowhouses.	
In towns of more than 5000 *inhabitants*	Smell and drainage of urine.
Distilleries in general; spirits, gin, kirschwasser, absinthe, and other alcoholic liquors	Danger of fire.
Dyeing	Smell and pollution of water.
—— of skins	Smell.
Earthenware (manufacture of).	
With smoke-consuming kilns	Accidental smoke.
With kilns not smoke-consuming	Smoke.
Enamel (application of) on metals	Do.
Enamels (manufacturing).	
With kilns not smoke-consuming	Do.

THIRD CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Enamelled ware (manufacture of).	
With smoke-consuming kilns . .	Accidental smoke.
Fattening of fowls in the towns (establishments for)	Smell.
Felt hats (manufacture of) . . .	Smell and dust.
Flints (kilns for calcining) . . .	Smoke.
Founding and rolling of lead, zinc, and copper	Noise; smoke.
Foundries for the second fusion . .	Smoke.
—— of copper, brass, and bronze . .	Metallic fumes.
Gases for lighting and heating (manufacture of).	
For particular use	Smell; danger of fire.
Gasometers for particular uses, not adjoining manufacturing works	Do. do.
Gelatine for food, and gelatines derived from fresh skins and dressing, and fresh hides	Smell.
Gilding and silvering of metals . .	Injurious emanations.
Glassworks, crystalworks, and manufactories of mirrors.	
With smoke-consuming kilns . .	Danger of fire.
Glucose and syrups from fecula (manufacture of)	Smell.
Gold and silver beaters	Noise.
Goldsmiths' waste (treatment of).	
By lead	Metallic fumes.
Guano (dépôts of).	
For sale by retail	Smell.
Gypsum (kilns for).	
Only working one month . .	Smoke and dust.
Herrings (salting of)	Smell.
Hungary leather tanneries . . .	Do.
Leather-dressing establishments . .	Smell.
Lime-kilns.	
Not working more than one month in the year	Smoke and dust.

THIRD CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Litharge (manufacture of) . . .	Noxious dust.
Manures (dépôts of) from middens.—Animal remains.	
Dried or disinfected, and in covered store, when the quantity is less than 2500 kilogrammes . . .	Smell.
Massicot (manufacture of) . . .	Noxious emanations.
Mechanical pounding of drugs . .	Noise and dust.
Mills for grinding lime, flints, and puozzolane	Dust.
Mineral charcoal (manufacture of).	
By pounding the residue of distillation of bituminous schists . . .	Smell and dust.
Morocco leather manufactories . .	Smell.
Nitrate of iron (manufacture of).	
When the injurious vapours are absorbed or decomposed . . .	Injurious emanations.
Oak bark (mills for)	Noise and dust.
Oilcloths for packing textures, tarred cords, tarred papers, pasteboards, and bituminous tubes (manufacture of).	
By cold method	Smell; danger of fire.
Oils (purification of)	Do. do.
Oil-works and oil-mills . . .	Do. do.
Olives (pickling of)	Pollution of water.
Painted cloths (manufacture of) . .	Smell.
Paper (manufacture of) . . .	Danger of fire.
—— pulp (preparation of).	
By means of straw and other combustible matters	Pollution of water.
Pasteboard makers	Smell.
—— snuff-boxes (manufacture of) . .	Smell; danger of fire.
Plates and polished metals . . .	Do. do.
Perchloride of iron (manufacture of).	
By solution of peroxide of iron . .	Injurious emanations.
Porcelain (manufacture of).	
With smoke-consuming kilns . .	Accidental smoke.
Puozzolane, artificial (kilns for) . .	Smoke.

THIRD CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Quicksilvering of mirrors . . .	Injurious emanations.
Rags (dépôts of)	Smell.
Red lead (manufacture of) . . .	Injurious emanations.
—— prussiate of potash . . .	Do.
Refrigerating preparations.	
By ammonia	Smell.
By ether, or other similar and combustible liquids	Danger of explosion and fire.
Salt of soda (manufacture of),	
With sulphate of soda . . .	Smoke ; injurious emanations.
Salting and preparation of meats . .	Smell.
—— (dépôts for), in the towns . .	Do.
Scalding-houses.	
For the preparation of parts of animals proper for food . . .	Do.
Sealing-wax (manufacture of) . .	Danger of fire.
Sheepskins (drying of)	Smell and dust.
Soapworks	Smell.
Sponges (washing and drying of) . .	Smell ; pollution of water.
Starch manufactories	Do. do.
Steel (manufacture of)	Smoke.
Sulphate of iron, alumina, and alum (manufacture of).	
By the washing of roasted pyrites and aluminous earth	Smoke and pollution of water.
—— of protoxide of iron or green copperas (manufacture on a large scale of).	
By the action of sulphuric acid on old iron	Smoke ; injurious emanations.
Sulphur (pulverising and sifting of) .	Dust ; danger of fire.
Thrashing and washing (spacious workshops for) worsteds, hairs, and waste of woollen and silk threads in the towns	Noise and dust.

THIRD CLASS—*continued.*

Names of Manufactures.	Cause of Complaint.
Thrashing, carding, and bleaching woollens, hairs, and feathers for bedding .	Smell and dust.
—— hides (hammer for) . . .	Noise and disturbance.
Tileworks.	
With kilns not smoke-consuming ,	Smoke.
Tin-plate (manufacture of) , , ,	Do.
Tobacco pipes (manufacture of).	
With smoke-consuming kilns , ,	Accidental smoke.
Wadding (manufacture of) . . .	Dust and danger of fire.
Wash-houses	Pollution of water.
—— for wool	Do.
Whalebone (working)	Unpleasant emanations.
White of zinc (manufacture of).	
By the combustion of the metal . .	Metallic fumes.
Wire-drawing works	Noise and smoke.
Wood carbon, in the towns (dépôts or stores of).	Danger of fire.
Yards for firewood, in the towns . .	Injurious emanations; danger of fire.

The gases and fumes which are emitted in the processes of trade are very numerous, and include the following :—

Hydrochloric acid, from alkali and steel works.

Sulphurous and sulphuric acid, from copper and steel works and bleaching.

Sulphuretted hydrogen, in many trades.

Carbonic acid, carbonic oxide, and sulphuric acid, from brickfields and cement works.

Arsenical fumes, from copper smelting.

Bisulphide of carbon, from some india-rubber works.

Carbonic oxide from iron furnaces, to the extent of 22 to 25 per cent.

Carbonic oxide from copper furnaces, to the extent of 15 to 19 per cent.

The injurious effects of trades upon health result from a variety of causes, as, for example, the mechanical or chemical action of the inhaled particles upon the air-passages; the action upon special organs or the general system of substances introduced into the blood; the inhalation of air rendered impure by overcrowding, or the fumes of gas combustion; and close confinement.

The following have been well established :—

1. Throat, nose, and pulmonary affections, due to the inhalation of solid particles :—

   Pottery workers, china scourers, grinders of steel, button makers, pin pointers, weavers, flax hacklers and spinners, grindstone makers, cement manufacturers, sulphuric acid makers, operatives in alkali and numerous chemical works, and compositors.

2. Other diseases:—

Brassfounders, coppersmiths, and tin-plate workers, sometimes have a peculiar ague.

Plumbers, painters, manufacturers in whitelead, are liable to paralysis.

Workers in mercury, as silvering mirrors and water gilding, are subject to a form of paralysis and salivation called mercurialismus.

Workmen in arsenical papers for walls and artificial flowers suffer from slow poisoning, and arsenic has been detected in their urine.

Chimney sweeps, subject to cancer.

Workers with phosphorus, as in making lucifer matches.

Lime-burners, well-sinkers, coal miners, are liable to suffocation from the inhalation of carbonic acid and other poisonous or explosive gases.

Increased mortality from the pursuit of certain trades has been clearly proved.

(No. 47.)

MORTALITY PER CENT. FROM PULMONARY DISEASE IN MINERS.

Age between	Cornwall.	Yorkshire.	Wales.
15 and 25 years	3·77	3·40	3·02
25 ,, 35 ,,	4·15	6·40	4·19
35 ,, 45 ,,	7·89	11·76	10·62
45 ,, 55 ,,	19·75	23·18	14·71
55 ,, 65 ,,	43·29	41·47	35·31
65 ,, 75 ,,	45·04	53·69	48·31

My enquiries in London in 1863 show the mortality in printers and tailors as compared with agricultural labourers (*Sixth Report of the Medical Officer of the Privy Council*, 1863).

(No. 48.)

ANNUAL MORTALITY PER CENT. 1860–1861.

Ages.	Printers.	Tailors.	Agricultural Labourers.
15 to 20 . . .	0·440 . .	0·734 . .	0·423
20 ,, 25 . . .	0·698 . .	0·715 . .	0·762
25 ,, 35 . . .	0·894 . .	0·958 . .	0·743
35 ,, 45 . . .	1·747 . .	1·262 . .	0·805
45 ,, 55 . . .	2·367 . .	0·805 . .	1·145

The duty assigned by the clause is to enquire into such offensive processes of trade, and to report on the appropriate means for the prevention of any nuisance or injury to health therefrom.

In pursuing the enquiry he should obtain his information by personal observation, and by the interrogation of persons capable of giving him correct information, so that he may be thoroughly acquainted with the part of the process which is offensive, and base his report upon a correct statement of facts. It should not suffice to merely ascertain the offensive character of the process, and to explain its occurrence in a general manner, for as the value of his report will in great part depend upon the suggestion of remedies, he must thoroughly master the details of the whole process.

In preparing the report it is desirable that the facts may be first and separately stated, for they are capable of description by the medical officer and of appreciation by the sanitary authority. The suggestion of remedies may be extremely difficult and beyond the power of the medical officer, and should not be attempted unless there is a very high probability of their efficacy. Although this is doubtless a most important duty, it is surrounded by so much difficulty that the medical officer should proceed with great caution, and, if necessary, leave the subject for the investigation of others who may have special knowledge thereon.

The report will have reference to two subjects, viz. nuisance and injury to health; and although the object of the Order is the improvement of Public Health, it does not appear that the nuisance need be of a character to cause injury to health. Assuming this to be the proper interpretation of the clause, a large field of enquiry is opened out to the medical officer, which might perhaps have been as well occupied by an officer of inferior qualifications and position, viz. to report on nuisances arising from the processes of trade. It is, however, clear that his chief duty is to enquire and report upon such as may cause injury to health, and to suggest appropriate means for the prevention of such a result.

It is probable that in certain localities this will lead to great difficulty in proving that the process is injurious to health, although it may be readily proved that it is offensive; and as it is not probable that those who carry on such trades will necessarily accept an adverse view from the medical officer of health, much litigation may be expected, at least unless the medical officer of health proceeds very cautiously. He will do well to base his opinion upon the actual fact of the occurrence of disease or ill-health, but he will always be met with the difficulty of clearly connecting the alleged effect with the assigned cause.

Although the clause does not direct him as to whom he should report, it must be held to mean that he shall report to the sanitary authority.

The following are the chief legal sanitary provisions in reference to trades:—

The Bakehouse Regulation Act, 1863.

(26 & 27 Vict. c. 40.)

Section 4.—The inside walls and ceiling, or top of every bakehouse, situate in any city, town, or place containing, according to the last census, a population of more than five thousand persons, and the passages and staircase leading thereto, shall either be painted with oil or be lime-washed or partly painted and partly lime-washed; where painted with oil, there shall be three coats of paint, and the painting shall be renewed once at least in every seven years, and shall be washed with hot water and soap once at least in every six months; where lime-washed, the lime-washing shall be renewed once at least in every six months.

Every bakehouse, wherever situate, shall be kept in a cleanly state, and shall be provided with proper means for effectual ventilation, and be free from effluvia arising from any drain, privy, or other nuisance.

If the occupier of any bakehouse fails to keep the same in conformity with this section, he shall be deemed to be guilty of an offence against this Act, and to be subject in respect of such offence to a penalty not exceeding five pounds.

The court having jurisdiction under this Act may, in addition to or instead of inflicting any penalty in respect of an offence under this section, make an order directing that, within a certain time to be named in such order, certain means are to be adopted by the occupier for the purpose of bringing his bakehouse into conformity with this section; the court may, upon application, enlarge any time appointed for the adoption of the means directed by the order; but any non-compliance with the order shall, after the expiration of the time as originally limited or enlarged by subsequent order, be deemed to be a continuing offence, and to be punishable by a penalty not exceeding one pound for every day that such non-compliance continues.

Section 6.—It shall be the duty of the local authority to enforce within their district the provisions of this Act, and in order to facilitate the enforcement thereof, any officer of health, inspector of nuisances, or any other officer appointed

by the local authority, hereinbefore referred to as the *Inspector*, may enter into any bakehouse at all times during the hours of baking, and may inspect the same, and examine whether it is or not in conformity with the provisions of this Act; and any person refusing to admit the inspector, or obstructing him in his examination, shall for each offence incur a penalty not exceeding twenty pounds.

And it shall be lawful for any inspector who is refused admission to any bakehouse, in pursuance of this section, to apply to any justice for a warrant authorising him, accompanied by a police-constable, to enter such bakehouse for the purpose of examining the same, and to enter the same accordingly.

The Public Health Act, 1848.

(11 & 12 Vict. c. 63.)

As to Slaughterhouses, &c.

Section 64.—And be it enacted that the business of a blood-boiler, bone-boiler, fellmonger, slaughterer of cattle, horses, or animals of any description, soap-boiler, tallow-melter, tripe-boiler, or other noxious or offensive business, trade, or manufacture, shall not be *newly* established in any building or place after the Act is applied to the district in which such building or place is situate without the consent of the local board of health;

And whosoever offends against this enactment shall be liable for each offence to a penalty of fifty pounds, and a further penalty of forty shillings for each day during which the offence is continued;

And the said local board may from time to time make such by-laws with respect to any such businesses so newly established as they may think necessary and proper in order to prevent or diminish the noxious or injurious effects thereof.

It was held by the judges, in reference to the meaning of the words "noxious and offensive business," that it must be analogous to those mentioned before these words. Mr. Justice Willes remarked "that the substances which are

dealt with in the trades which are specified are substances which, without anything being done to them, must be, or by progress of time must necessarily become, a nuisance and annoyance to the neighbourhood;" and he held it "necessary to be extremely cautious in construing this Act, whereby trades are brought within the jurisdiction of the justices."

It may also be added, in reference to the assent of the local board, that their assent would not be any bar to an action against any one carrying on a noxious and offensive trade within the meaning of the clause.

The Nuisances' Removal Act for England, 1855.
(18 & 19 Vict. c. 121.)

Section 27.—If any candlehouse, melting-house, melting-place, or soap-house, or any slaughterhouse, or any building or place for boiling offal, or blood, or for boiling, burning, or crushing bones, or any manufactory, building, or place used for any trade, business, process, or manufacture, causing effluvia, be at any time certified to the local authority by *any medical officer, or any two legally qualified medical practitioners*, to be a nuisance, or injurious to the health of the inhabitants of the neighbourhood, the local authority shall direct complaint to be made before any justice, who may summon before any two justices in petty sessions assembled at their usual place of meeting the person by or on whose behalf the work so complained of is carried on, and such justices shall enquire into such complaint; and if it shall appear to such justices that the trade or business carried on by the person complained against is a nuisance, or causes any effluvia injurious to the health of the inhabitants of the neighbourhood, and that such person shall not have used the best practicable means for abating such nuisance, or preventing or counteracting such effluvia, the person so offending (being the owner or occupier of the premises, or being a foreman or other person employed by such owner or occupier) shall upon a summary conviction for such offence forfeit and pay

a sum of not more than five pounds, nor less than forty shillings, and upon a second conviction for such offence the sum of ten pounds, and for each subsequent conviction a sum double the amount of the penalty imposed for the last preceding conviction, but the highest amount of such penalty shall not in any case exceed the sum of two hundred pounds:

Provided always that the justices may suspend their final decision in any case upon condition that the person so complained against shall undertake to adopt within a reasonable time such means as the said justices shall judge to be practicable and order to be carried into effect for abating such nuisance, or mitigating or preventing the injurious effects of such effluvia, or shall give notice of appeal in the manner provided by this Act, and shall enter into recognisances to try such appeal, and shall appeal accordingly:

Provided always that the provisions hereinbefore contained shall not extend or be applicable to any place without the limits of any city, town, or populous district:

Provided also that, if upon his appearance before such justices the party complained against object to have the matter determined by such justices, and enter into recognisances with sufficient sureties, to be approved by the justices, to abide the event of any proceedings at law or in equity that may be laid against him on account of the subject matter of complaint, the local authority shall thereupon abandon all proceedings before the justices, and shall forthwith take proceedings at law or in equity in Her Majesty's superior courts for preventing or abating the nuisance complained of.

The Gasworks' Clauses Act, 1871.

(34 & 35 Vict. c. 41.)

10 & 11 *Vict. c.* 15 *and this Act to be construed together.*

Section 1.—The Gasworks Clauses Act, 1847, and this Act shall be construed together as one Act, and the provisions of this Act shall be held to repeal and supersede such of the provisions of that Act as are inconsistent with this Act.

Short Title.

Section 2.—This Act may be cited as "The Gasworks' Clauses Act, 1871."

Application of Act.

Section 3.—The provisions of this Act shall apply to every gas undertaking authorised by any special Act hereafter passed, or by any provisional order made under the authority of the Gas and Water Works' Facilities Act, 1870, save where the said provisions are expressly varied or excepted by any such special Act or provisional order; and every such special Act and provisional order is in this Act included in the term "the special Act."

Interpretation of Terms.

Section 4.—Terms used in this Act have the same meanings respectively as the same terms have when used in the Gasworks' Clauses Act, 1847, and in the Gas and Water Works' Facilities Act, 1870.

The term "prescribed" in this Act shall mean prescribed by the special Act:

The term "premises" in this Act shall include house and building:

And the expression "superior courts" or "court of competent jurisdiction" in this Act, or in any Act wholly or partially incorporated herewith, shall be read and have effect as if the debt or demand in respect of which the expression is used were an ordinary simple contract debt and not a debt or demand created by statute.

GENERAL PROVISIONS.

Prohibition against erecting Gasworks elsewhere than on Lands specified in Schedule.

Section 5.—The undertakers shall not manufacture gas, or any residual products, except upon lands described in the special Act, and they shall not store gas, except upon those lands, without the previous consent in writing of the owner, lessee, and occupier of every dwelling-house situate

within three hundred yards of the limits of the site where such gas is intended to be stored.

Quality of Gas.

Section 12.—The quality of the gas supplied by the undertakers shall, with respect to its illuminating power, be such as to produce at the testing place provided in conformity with this Act a light equal in intensity to that produced by the prescribed number of sperm candles of six in the pound, and such gas shall as to its purity not exhibit any trace of sulphuretted hydrogen when tested in accordance with the rules prescribed in that behalf in Part II. of the Schedule A, to this Act annexed.

TESTING OF GAS.

Testing Place.

Section 28.—The undertakers shall cause to be provided, at the place prescribed and within the prescribed time, a testing place, with apparatus therein, for the purposes following, or such of them as may be prescribed by the special Act; that is to say:—

1. For testing the illuminating power of the gas supplied;
2. For testing the presence of sulphuretted hydrogen in the gas supplied.

The said apparatus shall be in accordance with the regulations prescribed in Part I. of the Schedule A to this Act annexed, or according to such rules as may from time to time be substituted in lieu thereof by any special Act, and shall be so situated and arranged as to be used for the purpose of testing the illuminating power and purity of the gas supplied by the undertakers, and the undertakers shall at all times thereafter keep and maintain such testing place and apparatus in good repair and working order.

Appointment and Powers of Gas Examiners.

Section 29.—The local authority of any district within the limits of the special Act, where the gas is not supplied by such local authority, may after the passing of the special Act from time to time appoint, or may appoint and keep

appointed, a competent and impartial person to be a gas examiner to test the gas at the testing place provided in conformity with the provisions of this Act; and such gas examiner may there test the illuminating power and purity of the gas supplied by the undertakers, on any or every day between the hours of five o'clock and ten o'clock in the afternoon from the 1st day of October to the 31st day of March, both inclusive, and on any or every day between the hours of eight o'clock and eleven o'clock in the afternoon from the 1st day of April to the 30th day of September, both inclusive.

Two Justices may appoint Gas Examiner.

Section 30.—Where no such gas examiner is appointed, or where the testing of the gas is imperfectly attended to by the local authority, two justices, on the application of consumers of the gas of the undertakers, not being less than five, by order in writing may appoint some competent and impartial person to be gas examiner, and such person may at any time within the hours aforesaid, on producing the said order, enter on the premises of the undertakers, and there test the illuminating power and purity of the gas supplied by them.

Representation of Undertakers.

Section 31.—The undertakers may, if they think fit, on each occasion of the testing of the gas by the gas examiner, be represented by some officer, but such officer shall not interfere in the testing.

Mode of Testing.

Section 32.—Any tests taken in pursuance of this Act shall be taken in accordance with the rules prescribed in Part II. of the Schedule A. to this Act annexed.

Report of Gas Examiner.

Section 33.—The gas examiner shall, on the day immediately following that on which the testing of the illuminating power or purity of the gas has been conducted, make and

deliver a report of the results of his testing to the local authority or justices by whom he was appointed, and to the undertakers, and such report shall be receivable in evidence.

Access to Testing Place.

Section 34.—The undertakers shall give to the gas examiner and to his assistants, and to every local authority within the limits of the special Act, and their agents, access to the testing place, and shall afford all facilities for the proper execution of this Act; and in case the undertakers make default in complying with any of the provisions of this section, they shall for every such default be liable to a penalty not exceeding five pounds to the local authority or to the persons making the application.

SCHEDULE A.

PART I.

REGULATIONS IN RESPECT OF TESTING APPARATUS.

1. *The Apparatus for Testing the Illuminating Power of the Gas* shall consist of the improved form of Bunsen's photometer, known as Letheby's open 60-inch photometer, or Evans' enclosed 100-inch photometer, together with a proper meter, minute clock, governor, pressure gauge, and balance.

The Burner to be used for testing the gas shall be such as shall be prescribed.

The Candles used for testing the gas shall be sperm candles of six to the pound, and two candles shall be used together.

2. *The Apparatus—*

(*a*) *For Testing the Presence in the Gas of Sulphuretted Hydrogen.*—A glass vessel containing a strip of bibulous paper moistened with a solution of acetate of lead, containing sixty grains of crystallised acetate of lead dissolved in one fluid ounce of water.

PART II.

RULES AS TO MODE OF TESTING GAS.

I. *Mode of Testing for Illuminating Power.*

The gas in the photometer is to be lighted at least fifteen minutes before the testings begin, and it is to be kept con-

tinuously burning from the beginning to the end of the tests.

Each testing shall include ten observations of the photometer made at intervals of a minute.

The consumption of the gas is to be carefully adjusted to five cubic feet per hour.

The candles are to be lighted at least ten minutes before beginning each testing, so as to arrive at their normal rate of burning, which is shown when the wick is slightly bent and the tip glowing. The standard rate of consumption for the candles shall be 120 grains each per hour. Before and after making each set of ten observations of the photometer, the gas examiner shall weigh the candles, and if the combustion shall have been more or less per candle than 120 grains per hour, he shall make and record the calculations requisite to neutralise the effects of this difference.

The average of each set of ten observations is to be taken as representing the illuminating power of that testing.

II. *Mode of Testing.*

(*a*) *For Sulphuretted Hydrogen.*—The gas shall be passed through the glass vessel containing the strip of bibulous moistened with the solution of acetate of lead for a period of three minutes, or such longer period as may be prescribed; and if any discoloration of the test paper is found to have taken place, this is to be held conclusive as to the presence of sulphuretted hydrogen in the gas.

CHAPTER VI.

TRADES UNDER THE SUPERVISION OF SPECIAL INSPECTORS.

NEARLY all the greatest trades and manufactories of the country have been placed under special regulations and the supervision of special inspectors appointed by the Government, as the inspectors of factories, mines, and alkali works, and therefore do not require the direct attention of the medical officer of health; but as they are most intimately connected with public health, it is desirable that that officer should be generally acquainted with them. We shall, therefore, insert portions of the Acts which have this connection.

THE ALKALI ACT, 1863.
(26 & 27 Vict. c. 124.)

ALKALI WORKS.

As to the Conduct of Alkali Works.

Section 4.—Every alkali work shall be carried on in such manner as to secure the condensation to the satisfaction of the inspector, derived from his own examination or from that of a sub-inspector, of not less than 95 per cent. of the muriatic acid gas evolved therein: Provided always that nothing herein contained shall entitle the inspector to direct any alteration to be made in the process of manufacture or the apparatus used therein.

If any alkali work is carried on in contravention of this section, the owner of that work shall, on its being made to appear to the court before which any proceedings for re-

covery of a penalty may be instituted that 95 per cent. at least of the muriatic acid gas evolved in such work has not been condensed, be deemed to be guilty of an offence against this Act, and be subject in respect of the first conviction to a penalty not exceeding fifty pounds, and in respect of every offence after a previous conviction to a penalty not exceeding one hundred pounds: Provided always that no such owner shall be convicted of more than one such offence in respect of any one day: Provided also that no such penalty shall be inflicted unless the inspector shall produce before the court having cognisance of the matter a statement in writing of the facts on which he founds his opinion that 95 per cent. of the muriatic acid gas evolved in the alkali work is not condensed therein, and serve a copy thereof with the process commencing the proceedings.

Owner to be liable for Offences in the First Instance, unless he prove that the offence was committed by some agent, &c. without his knowledge, in which case such agent, &c. to be liable.

Section 5.—The owner of any alkali work in which any offence against this Act has been proved to have been committed, and for which a pecuniary penalty may be imposed, shall in every case be deemed to have committed the offence, and shall be liable to pay the penalty, unless he shall prove to the satisfaction of the court before which any action shall be brought for the recovery of such penalty that he has used due diligence to comply with and to enforce the execution of this Act, and that the offence in question was committed by some agent, servant, or workman, whom he shall charge by name as the actual offender, without his knowledge, consent, or connivance, in which case such agent, servant, or workman, shall be liable to and may be sued for the payment of the penalty, and of the costs of all proceedings which may be taken for the recovery thereof, either against himself or against the owner under this Act: Provided that it shall be lawful for the inspector to proceed in the first instance against the person whom he shall believe to be the actual offender, without first proceeding

against the owner, in any case in which it shall be made to appear to the satisfaction of such inspector that the owner has used all due diligence to comply with and to enforce the execution of this Act, and that the offence has been committed by the person whom he may charge therewith without the knowledge, consent, or connivance of the owner, and in contravention of his orders.

As to the Registration of Alkali Works.

Section 6.—No alkali work shall at any time after the expiration of three months after the appointment of the inspector be carried on or prosecuted until such work has been registered by the owner with the inspector. In every register hereby required to be made there shall be inserted the name in full of the owner, and of the parish or township in which the work is situate, and within one month after change of ownership in any such work the register of such work shall be amended by inserting the name of the new owner; and if any alkali work is carried on in contravention of this section, the owner thereof shall, on conviction, be deemed to be guilty of an offence against this Act, and shall be subject to a penalty not exceeding five pounds for every day during which such work shall have been so carried on.

SPECIAL RULES.

Power to Owners of Works to make Special Rules.

Section 13.—The owner of any alkali work may, with the sanction of the Board of Trade, make, alter, or repeal special rules for the guidance of such of his workmen as are employed in any process causing the evolution of muriatic acid gas, or whose duty it is to attend to the apparatus used in the condensation of that gas, and may annex penalties to any violation of such rules, so that no penalty exceeds two pounds for any one offence.

A printed copy of the special rules in force in any alkali work shall be given by the owner of the work to every person working or employed in or about that work affected thereby.

THE COAL MINES' REGULATION ACT, 1872.

(35 & 36 Vict. c. 76.)

Application of Act.

Section 3.—This Act shall apply to mines of coal, mines of stratified ironstone, mines of shale, and mines of fire-clay.

EMPLOYMENT OF WOMEN, YOUNG PERSONS, AND CHILDREN.

Employment of Women and Children in Mines.

Section 4.—No boy under the age of ten years, and no woman or girl of any age, shall be employed in or allowed to be for the purpose of employment in any mine to which this Act applies below ground.

Employment of Boys in Mines.

Section 5.—A boy of the age of ten and under the age of twelve years shall not be employed in or allowed to be for the purpose of employment in any mine to which this Act applies below ground, except in a mine in which a Secretary of State, by reason of the thinness of the seams of such mine, considers such employment necessary, and by order, published as he may think fit, for the time being allows the same, nor in such case—

(*a*) For more than six days in any one week; or
(*b*) If he is employed for more than three days in any one week, for more than six hours in any one day; or
(*c*) In any other case for more than ten hours in any one day; or
(*d*) Otherwise than in accordance with the regulations hereinafter contained.

Hours of Employment of Boys and Male Young Persons in Mines.

Section 6.—A boy of the age of twelve and under the age of thirteen years, and a male young person under the age of sixteen years, shall not be employed in or allowed to be for the purpose of employment in any mine to which this Act applies below ground for more than fifty-four

hours in any one week, or more than ten hours in any one day, or otherwise than in accordance with the regulations hereinafter contained.

As to Employment of Women, Young Persons, and Children above Ground in Connection with Mines.

Section 12.—With respect to women, young persons, and children employed above ground, in connection with any mine to which this Act applies, the following provisions shall have effect:—

1. No child under the age of ten years shall be so employed.
2. The regulations of this Act with respect to boys of ten and under twelve years of age shall apply to every child so employed.
3. The regulations of this Act with respect to male young persons under sixteen years of age shall apply to every woman and young person so employed.
4. No woman, young person, or child shall be so employed between the hours of nine at night and five on the following morning, or on Sunday, or after two o'clock on Saturday afternoon.
5. Intervals for meals shall be allowed to every woman, young person, and child so employed, amounting in the whole to not less than half an hour during each period of employment which exceeds five hours, and to not less than one hour and a half during each period of employment which exceeds eight hours.

The provisions of this clause as to the employment of women, young persons, and children after two o'clock on Saturday afternoon shall not apply in the case of any mine in Ireland, so long as it is exempted in writing by a Secretary of State.

Register to be kept by Owner, &c. of Boys and Male Young Persons employed in Mines.

Section 13.—The owner, agent, or manager of every mine to which this Act applies shall keep in the office at the mine

a register, and shall cause to be entered in such register the name, age, residence, and date of first employment of all boys under the age of twelve years, and of the age of twelve and under the age of thirteen years, and of all male young persons under the age of sixteen years who are employed in the mine below ground, and of all women, young persons, and children employed above ground in connection with the mine, and a memorandum of the certificates of the school attendance of such boys obtained in pursuance of this Act, and shall produce such register to any inspector under this Act at the mine at all reasonable times when required by him, and allow him to inspect and copy the same.

The immediate employer of every boy or male young person of the ages aforesaid, other than the owner, agent, or manager of the mine, before he causes such boy or male young person to be in any mine to which this Act applies below ground, shall report to the manager of such mine, or some person appointed by such manager, that he is about to employ him in such mine.

As to Employment of Young Persons under Eighteen about Engines.

Section 14.—Where there is a shaft or an inclined plane or level in any mine to which this Act applies, whether for the purpose of an entrance to such mine or of a communication from one part to another part of such mine, and persons are taken up or down or along such shaft, plane, or level by means of any engine, windlass, or gin, driven or worked by steam or any mechanical power, or by an animal, or by manual labour, a person shall not be allowed to have charge of such engine, windlass, or gin, or of any part of the machinery, ropes, chains, or tackle connected therewith, unless he is a male of at least eighteen years of age.

Where the engine, windlass, or gin is worked by an animal, the person under whose direction the driver of the animal acts shall, for the purposes of this section, be deemed to be the person in charge of the engine, windlass, or gin, but such driver shall not be under twelve years of age.

Penalty for Employment of Persons in Contravention of Provisions of this Act.

Section 15.—If any person contravenes or fails to comply with, or permits any person to contravene or fail to comply with any provision of this Act with respect to the employment of women, girls, young persons, boys, or children, or to the attendance of boys at school, or to the register of boys and male young persons, or of women, young persons, and children, or to the reporting the intended employment of boys or male young persons, or to the employment of persons about any engine, windlass, or gin, he shall be guilty of an offence against this Act; and in case of any such contravention or non-compliance by any person whomsoever, the owner, agent, and manager shall each be guilty of an offence against this Act, unless he prove that he had taken all reasonable means by publishing and to the best of his power enforcing the provisions of this Act to prevent such contravention or non-compliance.

If it appear that a child, boy, or young person, or a person employed about an engine, windlass, or gin, was employed on the representation of his parent or guardian that he was of that age at which his employment would not be in contravention of this Act, and under the belief in good faith that he was of that age, the owner, agent, or manager of the mine and employer shall be exempted from any penalty, and the parent or guardian shall, for such misrepresentation, be deemed guilty of an offence against this Act.

The Factory Acts Extension Act, 1864.
(27 & 28 Vict. c. 48.)

PRELIMINARY.

Short Title.

Section 1.—This Act may be cited for all purposes as "The Factory Acts Extension Act, 1864."

Application of Act.

Section 2.—This Act shall apply only to the several manu-

factures and employments mentioned in the said first schedule.

Definition of Factory Acts.

Section 3.—The Factory Acts shall mean such provisions as are now in force of the Acts following; that is to say:—

An Act passed in the 4th year of the reign of His late Majesty, chapter 103, intituled "An Act to regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom";

An Act passed in the 7th year of the reign of Her present Majesty, chapter 15, intituled "An Act to amend the Laws relating to Labour in Factories";

An Act passed in the 14th year of the reign of Her present Majesty, chapter 54, intituled "An Act to amend the Acts relating to Labour in Factories";

An Act passed in the 17th year of the reign of Her present Majesty, chapter 104, intituled "An Act further to regulate the Employment of Children in Factories";

An Act passed in the 20th year of the reign of Her present Majesty, chapter 38, intituled "An Act for the further Amendment of the Laws relating to Labour in Factories."

SANITARY MEASURES.

Factory to be well Cleansed and Ventilated.

Section 4.—Every factory to which this Act applies shall be kept in a cleanly state, and be ventilated in such a manner as to render harmless, so far as is practicable, any gases, dust, or other impurities generated in the process of manufacture that may be injurious to health.

If the occupier of any factory fails to keep the same in conformity with this section, he shall be deemed to be guilty of an offence against this Act, and to be subject in respect of such offence to a penalty not exceeding ten pounds, nor less than three pounds.

The court having jurisdiction under this Act may, in addition to or instead of inflicting any penalty in respect of an offence under this section, make an order directing that within a certain time to be named in such order certain means are to be adopted by the occupier for the purpose of bringing his factory into conformity with this section; the court may upon application enlarge any time appointed for the adoption of the means directed by the order, but any non-compliance with the order of the court shall, after the expiration of the time as originally limited or enlarged by subsequent order, be deemed to be a continuing offence, and to be punishable by a penalty not exceeding one pound for every day that such non-compliance continues.

SPECIAL RULES.

Special Rules for Regulation of Workmen in Factories.

Section 5.—In order to prevent the requirements of this Act as to cleanliness and ventilation in a factory being infringed to the detriment of the occupier by the wilful misconduct or wilful negligence of the workmen employed therein, it shall be lawful for the occupier of any factory to make special rules for compelling the observance amongst his workmen of the conditions necessary to insure the required degree of cleanliness and ventilation, and to annex to any breach of such rules a penalty not exceeding one pound.

The special rules made in pursuance of this section shall not be of any validity until they have been approved by one of Her Majesty's principal Secretaries of State.

Printed copies of the special rules in force in any factory shall be hung up in a legible condition in two or more conspicuous places in the factory, and a printed copy shall be supplied to any person employed in the factory who may apply for a copy.

A printed copy of the special rules for the time being in force in any factory certified under the hand of the inspector for the time being having jurisdiction over such factory shall be evidence of such rules, and of their having been approved by the said Secretary of State, and it shall be the duty of the above-mentioned inspector to certify copies of special rules when required.

APPLICATION OF FACTORY ACTS.

The Factory Acts, as set out in Section 3, incorporated with this Act, and to apply to Manufactures, &c. in First Schedule.

Section 6.—The Factory Acts shall be incorporated with this Act, and shall apply to the several manufactures and employments mentioned in the said first schedule, with the qualifications and subject to the additions hereinafter mentioned:—

1. The term "factory" as used in this Act, and in the Acts incorporated herewith, shall mean in respect of the manufactures and employments to which this Act applies the premises in that behalf specified in the Second Schedule annexed to this Act, but all other terms in this Act shall have the same meaning as is assigned to them in the Factory Acts:
2. During the first six calendar months next ensuing the passing of this Act, children of not less than eleven years of age may be employed for the same time, and subject to the same conditions, for and subject to which young persons exceeding thirteen years of age may be employed in pursuance of the said Factory Acts:
3. During the first thirty calendar months next ensuing the passing of this Act, children of not less than twelve years of age may be employed for the same time, and subject to the same conditions, for and subject to which young persons exceeding thirteen years of age may be employed in pursuance of the said Factory Acts:
4. In the manufacture of lucifer matches no child, young person, or woman shall be allowed to take his or her meals in any part of the factory where any manufacturing process (except that of cutting the wood) is usually carried on; and any child, young person, or woman who is allowed to take his or her meals in any part of the factory in contravention of the said provision shall be deemed to be employed contrary to the provisions of the Factory Acts:

5. In the employment of fustian cutting no child shall be allowed to commence work until the attainment of the age of eleven years; and any child who is allowed to commence work in the employment of fustian cutting before the said age of eleven years shall be deemed to be employed contrary to the said Factory Acts:
6. During the first eighteen calendar months next ensuing the passing of this Act, so much of the said Factory Acts as provides that during any time allowed for meals no child, young person, or woman shall be employed or allowed to remain in any room in which any manufacturing process is carried on, and that all the young persons employed in a factory shall have the time for meals at the same period of the day, shall not apply to the employment of paper staining, or to the manufacture of earthenware; subject to this proviso, that, in the case of the manufacture of earthenware, at no time after the passing of this Act shall any child, young person, or woman be allowed to take his or her meals, or to remain during any time allowed for meals, in the dipping houses, dipper's drying rooms, or china-scouring rooms:
7. Whereas by the said Act of the session of the 7th and 8th years of the reign of Her present Majesty, chapter 15, section 18, it is provided, amongst other things, that all the inside walls, ceilings, or tops of rooms, whether plastered or not, and all the passages and staircases of every factory which shall not have been painted with oil once at least within seven years, shall be limewashed once at least within every successive period of fourteen months, to date from the period when last whitewashed: Be it enacted that, in the case of the manufacture of earthenware, the above-recited provision shall not apply to those parts of the factory which are solely used for the storage of earthenware, and in which no work is carried on except such as is by the custom of the trade incidental

to such storage, or necessary for keeping the earthenware in a fit state for sale.

Recovery and Application of Penalties.

Section 7.—All penalties under this Act, including penalties for breach of a special rule, shall be recoverable and applied in manner in which penalties are recoverable and applicable under the said Factory Acts, and the term "court" as used in this Act shall include any justices, sheriff, or other magistrate having jurisdiction in respect of such penalties.

SCHEDULES

To which the foregoing Act refers.

First Schedule.

Manufactures and Employments to which Act applies.

The manufacture of earthenware, except bricks and tiles, not being ornamental tiles.
The manufacture of lucifer matches.
The manufacture of percussion caps.
The manufacture of cartridges.
The employment of paper staining.
The employment of fustian cutting.

Second Schedule.

Definition of the Word "Factory."

In the manufacture of earthenware, except as aforesaid :
Any place in which persons work for hire in making or assisting in making, finishing or assisting in finishing, earthenware of any description.

In the manufacture of lucifer matches :
Any place in which persons work for hire in making lucifer matches, or in mixing the chemical materials for making them, or in any process incidental to making lucifer matches, except the cutting of the wood.

In the manufacture of percussion caps :
Any place in which persons work for hire in making percussion caps, or in mixing or storing the chemical materials for making them, or in any process incidental to making percussion caps.

In the manufacture of cartridges :
Any place in which persons work for hire in making cartridges, or in any process incidental to making cartridges, except the manufacture of the paper or other material that is used in making the cases of the cartridges.

In the employment of paper staining :
Any place in which persons work for hire in printing a pattern in colours upon sheets of paper either by blocks applied by hand, or by rollers worked by steam, water, or other mechanical power.

In the employment of fustian cutting :
Any place in which persons work for hire in fustian cutting.

For the purposes of this Act an apprentice shall be deemed to be a person working for hire.

No building or premises used solely for the purpose of a dwelling-house shall be deemed to be a factory or part of a factory within the meaning of this Act.

The Factory Acts Extension Act, 1867.

(30 & 31 Vict. c. 103.)

PRELIMINARY.

Short Title.

Section 1.—This Act may be cited for all purposes as "The Factory Acts Extension Act, 1867."

Application of Act.

Section 2.—This Act shall apply to the whole of the United Kingdom.

General Definitions.

Section 3.—For the purposes of this Act the following words shall in this Act and in the Acts incorporated herewith, hereinafter included under the expression "this Act," have the meanings hereby applied to them, unless there is something in the context inconsistent with such meanings; that is to say :—

Factory.

"Factory" shall mean as follows :—

1. Any blast furnace or other furnace or premises in or on which the process of smelting or otherwise

obtaining any metal from the ores is carried on (which furnace or premises are hereinafter referred to as a blast furnace) :

2. Any copper mill :
3. Any mill, forge, or other premises in or on which any process is carried on for converting iron into malleable iron, steel, or tin plate, or for otherwise making or converting steel (which mills, forges, and other premises are hereinafter referred to as iron mills) :
4. Iron foundries, copper foundries, brass foundries, and other premises or places in which the process of founding or casting any metal is carried on :
5. Any premises in which steam, water, or other mechanical power is used for moving machinery employed—
   (*a*) In the manufacture of machinery ;
   (*b*) In the manufacture of any article of metal not being machinery ;
   (*c*) In the manufacture of india-rubber or gutta-percha, or articles made wholly or partly of india-rubber or gutta-percha :
6. Any premises in which any of the following manufactures or processes are carried on, namely—
   (*a*) Paper manufacture ;
   (*b*) Glass manufacture ;
   (*c*) Tobacco manufacture ;
   (*d*) Letterpress printing ;
   (*e*) Bookbinding :
7. Any premises, whether adjoining or separate, in the same occupation, situate in the same city, town, parish, or place, and constituting one trade establishment, in, on, or within the precincts of which fifty or more persons are employed in any manufacturing process :

And every part of a factory shall be deemed to be a factory, except such part, if any, as is used exclusively as a dwelling.

Manufacturing Process.

"Manufacturing process" shall mean any manual labour exercised by way of trade or for purposes of gain in or

incidental to the making any article or part of an article, or in or incidental to the altering, repairing, ornamenting, finishing, or otherwise adapting for sale any article.

Definition of Factory Acts.

Section 4.—The Factory Acts shall in this Act mean the 4th and 5th sections of the Factory Acts Extension Act, 1864, relating to sanitary measures and special rules, and such provisions as are now in force of the Acts following:—

An Act passed in the 4th year of the reign of His late Majesty William IV., chapter 103, intituled "An Act to regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom," which henceforth may be cited for all purposes as "The Factory Act, 1833";

An Act passed in the 7th year of the reign of Her present Majesty, chapter 15, intituled "An Act to amend the Laws relating to Labour in Factories," which henceforth may be cited for all purposes as "The Factory Act, 1844";

An Act passed in the 14th year of the reign of Her present Majesty, chapter 54, intituled "An Act to amend the Acts relating to Labour in Factories," which henceforth may be cited for all purposes as "The Factory Act, 1850";

An Act passed in the 17th year of the reign of Her present Majesty, chapter 104, intituled "An Act further to regulate the Employment of Children in Factories," which henceforth may be cited for all purposes as "The Factory Act, 1853"; and

The Factory Act, 1856.

Exemptions from Provisions of this Act and Schedule annexed.

Section 5.—There shall be excluded from the provisions of this Act and of the schedule annexed hereto:—

1. Any buildings or premises defined to be a factory by the Factory Act, 1844, and subject to the regulations of that Act and of the Acts directed to be construed as one therewith;

4. Any lace factories subject to the provisions of the

Act of the session of the 24th and 25th years of the reign of Her present Majesty, chapter 117, and intituled "An Act to place the Employment of Women, Young Persons, Youths, and Children in Lace Factories under the Regulations of the Factory Acts," and of the Acts therein recited;

5. Any bakehouse as defined by the Bakehouse Regulation Act, 1863;
6. Any factory subject to the provisions of the Factory Acts Extension Act, 1864.

Application of Factory Acts to Factories not included in such Acts.

Section 6.—The Factory Acts as hereinbefore defined shall be incorporated with this Act, and, subject to the modifications mentioned in the schedule annexed hereto, shall, from and after the 1st day of January, 1868, be in force in every factory which is not excluded from the operation of this Act.

Restrictions as to Employment of Children, Young Persons, and Women in certain Factories.

Section 7.—

1. No child, young person, or woman shall be employed on Sunday in or about any factory, subject to the modifications in the schedule as regards blast furnaces;
2. No boy under the age of twelve years, and no female, shall be employed in any part of a glass factory in which the process of melting or annealing glass is carried on;
3. No child under the age of eleven years shall be employed in grinding in the metal trades;

And any child, young person, or woman who is employed in contravention of this section shall be deemed to be employed in manner contrary to the provisions of the Factory Acts.

Meals not to be taken in certain Parts of Glass Factory.

Section 8.—In the manufacture of glass, no child, young person, or woman shall be allowed to take his or her meals

in any part of the factory where the materials are mixed, or in the manufacture of flint glass where the work of grinding, cutting, and polishing is carried on; and any child, young person, or woman allowed to take his or her meals in contravention of the said provision shall be deemed to be employed in manner contrary to the provisions of the Factory Acts.

Extension of Provision relating to Ventilation in Factories.

Section 9.—In every factory where grinding, glazing, or polishing on a wheel, or any other process is carried on by which dust is generated and inhaled by the workmen to an injurious extent, if it appears to any inspector of factories that such inhalation could be to a great extent prevented by the use of a fan or other mechanical means, it shall be lawful for the inspector to direct a fan or other mechanical means, of such construction as may from time to time be approved by one of Her Majesty's principal Secretaries of State, to be provided by the occupier of the factory within a reasonable time; and if such occupier fail to comply with such direction, he shall be deemed to have failed to have kept his factory in conformity with the 4th section of the Factories Act Extension Act, 1864, and shall be punishable accordingly.

Penalty on not Fixing Grindstones securely.

Section 10.—If it appears to any inspector that any grindstone, worked by steam or other mechanical power in any factory, is fixed in so faulty a manner as to be likely to cause bodily injury to the grinder using the same, such inspector shall take the same proceedings as nearly as may be as he is required to take by the Factory Act, 1844, with respect to machinery not securely fenced; and the occupier of the factory shall be liable to the same penalties for not properly fixing the said grindstone as he would be liable to under the said Act in respect of any machinery found to be not properly fenced.

Inspectors or Sub-Inspectors to be furnished with Certificates of Appointment as Secretary of State may direct.

Section 11.—Every inspector or sub-inspector of factories

shall be furnished with such certificate of his appointment as the Secretary of State may direct, and on applying for admission to any factory such inspector or sub-inspector shall, if required, produce to the occupier the said certificate.

Every person who forges or counterfeits any such certificate, or makes use of any forged, counterfeited, or false certificate, or falsely pretends to be an inspector or sub-inspector of factories, shall be guilty of a misdemeanour, and be liable to be imprisoned for any period not exceeding three months, with or without hard labour.

Rule as to Number of Persons employed to constitute a Factory.

Section 12.—Fifty or more persons shall for the purposes of this Act be deemed to continue to be employed in any factory during the year 1868 and any succeeding year, if that number of persons has during the preceding year been employed in any manufacturing process in such factory for any period or periods amounting in the whole to 100 days; and in any proceedings taken by any inspector or sub-inspector of factories for the purpose of enforcing this Act, any premises in or on which a manufacturing process is carried on shall, until the contrary is proved, be deemed to be a factory.

Exception as to Founding and Casting Metals.

Section 13.—Any premises or places on which the process of founding or casting any metal is carried on by not more than five persons, and as subsidiary to the repair or completion of some other work, shall not, by reason only of such founding or casting, be deemed to be a factory within the meaning of this Act.

Power to Secretary of State to Substitute other Regulations as to Surgical Certificates.

Section 14.—In blast furnaces and iron mills, one of Her Majesty's principal Secretaries of State may, by order under his hand, dispense with so much of the said Factory Acts as relates to surgical certificates given by a certifying surgeon, and substitute therefor such other regulations as to proof of the age of children and young persons, and of their bodily

health and capacity for working daily for the time allowed by the said Acts, as he may think expedient, and any regulation so made by the Secretary of State shall be of the same force as if they had been enacted in the Factory Acts in place of the regulations for which they are so substituted.

Power to Occupier of Blast Furnace or Iron Mill to make Special Rules.

Section 15.—The occupier of a blast furnace or of an iron mill may, with the approval provided by the 5th section of the Factory Acts Extension Act, 1864, make rules for compelling the observance amongst his workmen of any of the provisions of the Factory Acts in respect of the infringement of which such occupier is liable to a penalty, and such rules shall be deemed to be special rules within the meaning of the said 5th section, and all the provisions of the said section shall apply accordingly.

SCHEDULE.

PERMANENT MODIFICATIONS.

9. The 29th section of the Factory Act, 1833, and the 18th section of the Factory Act, 1844, relating to the lime-washing and washing of factories, shall not be in force as respects any factory.

10. No factory shall be so overcrowded while work is carried on as to be dangerous or prejudicial to the health of those employed therein, and so far as relates to any factory this section shall be construed as part of the 4th and 5th sections of the Factory Acts Extension Act, 1864.

11. Whereas the customs or exigencies of certain trades require that male young persons of the age of sixteen years and upwards should be occasionally employed beyond the hours allowed by the Factory Acts: It shall be lawful for one of Her Majesty's principal Secretaries of State, on due proof to his satisfaction that such customs or exigencies exist, and that such occasional employment is not injurious to the health of such male young persons, from time to time, by order to be advertised in the *London Gazette*, or otherwise published in such manner as he may think fit, to give permission that in the case of any

particular factory or class of factories male young persons of sixteen years of age and upwards may be employed for a period not exceeding fifteen hours on any one day :

Provided that—

1st. They are not so employed except between the hours of six in the morning and nine in the evening ;

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of five in the evening ;

3rd. They are not so employed for more than twelve days in any period of four weeks, nor on the whole for more than seventy-two days in any period of twelve months.

12. Whereas the customs or exigencies of certain trades require that the children, young persons, and women working in a factory, or in certain processes in a factory, or that certain sets of such children, young persons, or women, or any of them, should be employed at different hours, and that the limits of time within which they or certain sets of them may be employed should be extended without increasing their legal hours of work: It is hereby declared that, on due proof to the satisfaction of one of Her Majesty's principal Secretaries of State of such customs or exigencies existing in a trade, it shall be lawful for the said Secretary from time to time, by order to be advertised in the *London Gazette*, or otherwise published in such manner as the Secretary of State may think fit, to give permission that in the case of any particular factory or class of factories in which such trade is carried on the occupier may employ the children, young persons, and women working in his factory, or in any processes of his factory, or any sets of such children, young persons, or women, or of any of them, between the hours of seven in the morning and seven in the evening, or between the hours of eight in the morning and eight in the evening, instead of between the hours of six in the morning and six in the evening, for any time in such order specified, or until further order, or on any day or days named in such order ; and so far as respects the persons referred to in any order given as aforesaid, all the provisions of the Factory Acts affected by such change of hours shall, during the continuance of such order, be read as if the hours of seven in the morning and seven in the evening, or eight in the morning and eight in the evening, as circumstances may require, were throughout such Act substituted for the hours of six in the morning and six in the evening :

Provided—

1st. That notice of the hours between which children, young persons, and women, or each set of them, are to be employed, in such form as the inspectors of factories may direct, and signed by one of such inspectors and

the occupier or his agent, shall be hung up and be kept hung up during the period affected by such notice in such conspicuous place in the factory as may be required by one of the inspectors of factories ;

2ndly. Except in pursuance of the provisions contained in other parts of this Act, no child, young person, or woman shall be employed after the hour of two o'clock in the afternoon on Saturday ; but it shall be lawful in cases where any children, young persons, or women are employed in accordance with an order given under the foregoing enactment to begin to employ such children, young persons, or women at six o'clock in the morning on Saturday.

13. In letterpress printing male young persons of the age of sixteen years and upwards may be employed for a period not exceeding fifteen hours in any one day :

Provided that—

1st. They shall not be so employed except between the hours of six in the morning and nine in the evening, or in any factory where permission has been given by the Secretary of State to work between the hours of seven in the morning and seven in the evening, or of eight in the morning and eight in the evening, then except between the hours of seven in the morning and ten in the evening, or of eight in the morning and eleven in the evening, as the case may be ;

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of six in the evening ;

3rd. They shall not be so employed except on alternate days ;

4th. In every week in which they are so employed on each alternate day they shall be allowed either one whole holiday or two half-holidays, each half-holiday comprising at least one-half of an ordinary working day.

In letterpress printing male young persons of sixteen years of age and upwards may work on alternate weeks at night between the hours of one in the morning on Monday and eleven in the evening on the succeeding Saturday :

Provided—

1st. That they are not employed for more than eleven and a half hours at any one time, with intervals of rest for meals amounting in the whole to not less than one hour and a half ;

2nd. That there is an interval of twelve hours between each period of employment ;

3rd. That the total number of hours of work in any one week do not exceed sixty hours.

14. Young persons of fourteen years of age and upwards and women may be employed in bookbinding for a period not exceeding fourteen hours on any one day:

Provided that—

1st. They shall not be so employed except between the hours of six in the morning and eight in the evening, or where permission has been given by the Secretary of State to work between the hours of seven in the morning and seven in the evening, or of eight in the morning and eight in the evening, then except between the hours of seven in the morning and nine in the evening, or eight in the morning and ten in the evening, as the case may be;

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of six in the evening;

3rd. They shall not be so employed—

(*a*) If less than sixteen years of age, for more than three days in any one month; or

(*b*) If sixteen years of age or upwards, for more than ninety-six days in any period of twelve months, or for more than five consecutive days in any one week.

15. Where, under the modifications contained in the schedule to this Act, any child, young person, or woman is employed on any day for a longer period than is allowed by the Factory Acts, the day on which and the period during which he or she is so employed shall be entered by the occupier of a factory in a register, which shall be in such form as the inspectors of factories may direct, and shall be deemed to be a register within the meaning of the Factory Acts.

16. So much of the said Factory Acts as provide that during any time allowed for meals no child, young person, or woman shall be employed or allowed to remain in any room in which any manufacturing process is carried on shall not apply to iron mills, to paper manufactories, or any factory in which letterpress printing is carried on, or, except as in this Act mentioned, to glass manufactories, or to any factory or process in a factory to which the said Secretary of State may by order declare the same to be inapplicable; and so much of the said Factory Acts as provides that all the young persons employed in a factory shall have the time for meals at the same period of the day shall not apply to blast furnaces, iron mills, to paper manufactories, any factory in which letterpress printing is carried on, to glass manufactories, or, except as in this Act mentioned, to any factory, or

process in a factory, to which the said Secretary of State may by order declare the same to be inapplicable.

17. In blast furnaces, in iron mills, in any factory in which letterpress printing is carried on, in paper mills, in any factory in which the mechanical power is water, and in any factory or class of factories, with respect to which one of Her Majesty's principal Secretaries of State certifies by order that it has been proved to his satisfaction that by reason of the nature of the business it is necessary to carry on the same throughout the night, it shall be lawful to employ male young persons during the night, subject to the same intervals of rest which they are allowed during the day, and subject to this provision, that no male young person employed during the night shall be employed during either the preceding or succeeding day, and that no male young person shall be employed more than six nights, or, in the case of blast furnaces and paper mills, seven nights, in any fortnight.

18. Where in any blast furnace, iron mill, foundry, or paper mill the process in which a child, young person, or woman is employed is in an incomplete state at the hour at which such child, young person, or woman is required by this Act to cease work, such child, young person, or woman may be employed for a period not exceeding thirty minutes beyond the said hour.

19. It shall not be necessary to give notice to the certifying surgeon of any accident to a person employed in any iron mill or blast furnace unless the accident prevents the person injured from returning to his work for a period of forty-eight hours from the time of the accident. When the person injured shall have been absent for such period of forty-eight hours, the actual employer of the person injured shall immediately report the absence of such person to the occupier of the factory; and if the inspector or sub-inspector of factories is satisfied that notice of an accident has not been given to the certifying surgeon, owing to the default of such actual employer and not of the occupier, he shall take proceedings against such actual employer instead of against the occupier.

20. In the case of any accidental delay occurring in any process in any glassworks, in order to recover the time so lost, any male child or male young person may be employed one hour more than the time during which such child or young person might otherwise be employed, provided that the total number of hours worked do not exceed sixty in any one week.

21. In the process of making glass it shall be lawful for any male young person, subject to the provisions of this Act, to work according to the accustomed hours of the trade:

Provided—

1st. That the hours of work do not exceed sixty in any one

week, between midnight on Sunday night and midnight on the succeeding Saturday night;

2nd. That the hours of work for any such young person do not exceed fourteen hours in four separate turns per week, or twelve hours in five separate turns per week, or ten hours in six separate turns per week;

3rd. That no such young person work in any turn without an interval of time equal to one full term.

22. In paper mills it shall be lawful for any male young person, subject to the provisions of this Act, to work according to the accustomed hours of the trade:

Provided—

1st. That the hours of work do not exceed sixty in any one week, between midnight on Sunday night and midnight on the succeeding Saturday night;

2nd. That the hours of attendance at the mill of any such young person shall not in any period of twenty-four hours exceed fourteen hours, and in case the hours of attendance exceed twelve hours, such young person shall be allowed half an hour for a meal in addition to the time allowed under the Factory Acts for meals.

23. So much of the said Factory Acts as require that in England and Ireland male young persons must have eight half-holidays in every year, in addition to Christmas Day and Good Friday, and in Scotland any day wholly set apart for the observance of the Sacramental Fast, and so much of the same Acts as forbid the employment of male young persons on any Saturday after two o'clock of the afternoon, shall not apply to male young persons employed in day and night turns, changing every alternate week, and so much of the same Acts as forbids the employment of women and young persons on any Saturday after two of the clock of the afternoon shall not apply in any week to any woman or female young person whose hours of work have not exceeded eight in any day of that week.

24. Where it appears to one of Her Majesty's principal Secrepal Secretaries of State that the regulations of the Factory Acts relating to the fencing of machinery require to be modified in any particular trade, and that such modifications can be made with due regard to the safety of the children, young persons, and women employed, he may, by order with respect to any particular factory or any class of factories, modify the said regulations, so far as such trade is concerned, upon such terms and in such manner as he thinks fit. Such order shall be advertised in the *London Gazette*, or otherwise published in such manner as the Secretary of State may think fit. Any regulations so modified by the said Secretary of State shall be of the same validity as if they had been the original regulations contained in the Factory Acts.

25. The said Secretary of State, on proof to his satisfaction that the customs or exigencies of the trade require the alteration to be made, may, by order to be advertised in the *London Gazette*, or otherwise published in such manner as the Secretary of State may think fit, give permission, with respect to any particular factory or class of factories, for any one or more of the following things, namely :—

(*a*) That four whole holidays in any year may be allowed as a substitute for the eight half-holidays required to be given to every child, young person, and woman by the Factory Acts ; or

(*b*) That the eight half-holidays required to be given by the Factory Acts to all the children, young persons, and women employed may be given on different days to any of the children, young persons, and women, or to any sets of such children, young persons, and women, and not at the same time ; or

(*c*) That children, young persons, or women may be employed between two and eight o'clock in the afternoon on Saturday, provided that in any such factory or factories arrangements are made to the satisfaction of the said Secretary of State for giving on some work-day in every week, to every child, young person, or woman so employed, a half-holiday of equal length either at the beginning or at the end of their day's work ; or

(*d*) That in any factory or factories where such Secretary has given permission to work between the hours of seven in the morning and seven in the evening, or of eight in the morning and eight in the evening, children, young persons, and women may be employed on Saturday, or on any other day on which the weekly half-holiday is given, between the hours of seven in the morning and three in the afternoon, or between eight in the morning and four in the afternoon ; or

(*e*) That a surgical certificate given by a certifying surgeon shall not be invalid solely on account of the employment of the child or young person named in such certificate in a factory other than that for which the certificate was originally granted, if such factory is within the district of the same certifying surgeon ;

(*f*) That male young persons of not less than sixteen years of age may be employed in the same manner as if they were male persons exceeding the age of eighteen years.

26. Where the occupier of any factory is a person of the Jewish religion, and it is his custom to keep such factory closed on Saturdays until sunset, it shall be lawful for him to employ young

persons or women on that day from after sunset until nine o'clock at night.

27. Where in any factory the owner or hirer of any machine or implement moved by steam, water, or other mechanical power, in or about or in connection with which machine or implement children, young persons, or women are employed, is some person other than the occupier of the factory, and such children, young persons, or women are in the employment and pay of the owner or hirer of such machine, in any such case such owner or hirer shall, so far as respects any offence against the Factory Acts which may be committed in relation to such children, young persons, or women, be deemed to be the occupier of the factory.

The Factory and Workshops Act, 1870.
(33 & 34 Vict. c. 62.)

PRELIMINARY.

Short Title.

Section 1.—This Act may be cited as "The Factory and Workshop Act, 1870."

PART I.—PRINT WORKS AND BLEACHING AND DYEING WORKS.

Construction of Act.

Section 2.—This part of this Act shall be construed as one with the Factory Acts Extension Act, 1867, in this part of this Act referred to as the principal Act.

Definition of Terms.

Section 3.—In this Act—

The term "print works" means any premises in which any persons are employed to print figures, patterns, or designs upon any cotton, linen, woollen, worsted, or silken yarn, or upon any woven or felted fabric, not being paper;

The term "bleaching and dyeing works" means any premises, whether in the open air or not, in which the processes of bleaching, beetling, dyeing, calendering, finishing, hooking, lapping, and making up

and packing any yarn or cloth of any material, or the dressing or finishing of lace, or any one or more of such processes, or any process incidental thereto, are or is carried on.

Application of Factory Acts to Print Works and Bleaching and Dyeing Works.

Section 4.—After the 1st day of January, 1872, the principal Act and the schedule thereto (containing the permanent modifications) shall apply to print works and bleaching and dyeing works, in the same manner in all respects as if the word "factory" had been defined by Section 3 of the principal Act to mean print works and bleaching and dyeing works, subject, nevertheless, to the following qualification:

The schedule to the principal Act shall be construed as if there were contained in that schedule the permanent modifications contained in the first schedule to this Act.

Provided that during the year beginning on the 1st day of January, 1871, the following regulations shall be observed in print works, in turkey-red dyeing works, and in the process of open-air bleaching (that is to say):—

1. Children shall be employed only for the same time and subject to the same conditions for and subject to which young persons exceeding thirteen years of age will be allowed to be employed therein after the 1st day of January, 1872;
2. No woman and no female child or young person shall be employed at night except so far as she will be allowed to be so employed after the 1st day of January, 1872;

And for the purpose of enforcing the said regulations the principal Act shall apply to such works and process in the same manner and subject to the same qualification as it will apply thereto after the 1st day of January, 1872.

Repeal of Acts.

Section 5.—After the 1st of January, 1872, the Acts mentioned in the first part of the third schedule to this Act shall be repealed, and the Act mentioned in the second

part of the same schedule shall be repealed to the extent in the third column of that schedule mentioned.

PART II.—FRUIT AND FISH PRESERVES.

Modification as regards Manufactures of Preserves of Fruit and Fish of 30 & 31 *Vict. c.* 103, *and* 30 & 31 *Vict. c.* 146.

Section 6.—The schedule to the Factory Acts Extension Act, 1867, and the schedule to the Workshop Regulation Act, 1867, shall be construed as if there were contained in each of those schedules the permanent modification contained in the second schedule to this Act.

FIRST SCHEDULE.

PERMANENT MODIFICATIONS.

1. Whereas the customs or exigencies of the trade require that in print works and bleaching and dyeing works male young persons of the age of sixteen years and upwards should be occasionally employed beyond the hours allowed by the Factory Acts: It shall be lawful for one of Her Majesty's principal Secretaries of State, on due proof to his satisfaction that such customs or exigencies exist in the case of any print works, or bleaching and dyeing works, and that such occasional employment is not injurious to the health of such male young persons, from time to time, by order to be advertised in the *London Gazette*, or otherwise published in such manner as he may think fit, to give permission that in the case of any particular factory or class of factories male young persons of sixteen years of age and upwards may be employed for a period not exceeding fifteen hours on any one day:

Provided that—

1st. They are not so employed except between the hours of six in the morning and nine in the evening;

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of six in the evening;

3rd. They are not so employed on the whole for more than seventy-two days in any period of twelve months, or for more thon five consecutive days in any one week.

2. Where it is shown to one of Her Majesty's principal Secretaries of State that, by reason of the nature of any process in any print works or bleaching and dyeing works, the time for the completion of such process cannot be accurately fixed: It shall be lawful for such Secretary of State from time to time, by order,

to be advertised in the *London Gazette*, or otherwise published in such manner as he may think fit, to give permission in the case of any factory or class of factories that if, during the time limited by the order or during the continuance of the order, such process is in an incomplete state at the hour at which any child, young person, or woman employed in such process is required by this Act to cease work, such child, young person, or woman may be employed in such process for a period not exceeding thirty minutes beyond the said hour.

3. In bleaching and dyeing works time lost by the breakage of machinery, or by reason of frost or snow, may be recovered in the same manner and subject to the same conditions as time lost by stoppages from want of water or from too much water may be recovered under the Factory Acts.

4. So much of the Factory Acts as provides that all the young persons employed in a factory shall have the time for meals at the same period of the day shall not apply to male young persons employed in that part of any print works or bleaching and dyeing works in which the process of dyeing or open-air bleaching is carried on; and nothing in the Factory Acts shall be deemed to prevent in any such part any male young person, during the time allowed for meals to any other young person or to any child or woman, from being employed or allowed to remain in any room in which any manufacturing process is carried on, or to prevent, during the time allowed for meals to any male young person, any other young person or any child or woman from being employed or allowed to remain in any room in which any manufacturing process is carried on.

5. So much of the Factory Acts as provides that in any factory in which the labour of young persons is restricted to ten hours in any one day a child may be employed ten hours in any one day on three alternate days of every week, subject to the conditions specified in the said Factory Acts, shall extend to authorise, in print works and bleaching and dyeing works in which the labour of young persons is restricted to ten hours and a half in any one day, the employment of children for ten hours and a half in any one day on three alternate days of every week, subject to the said conditions.

6. In the operation of bleaching by the open-air process, and in the process of turkey-red dyeing, whenever emergencies arising from the state of the weather or the nature of the processes render it necessary, any woman or young person may, subject to the provisions of the principal Act and this Act, work according to the accustomed hours of the trade:

Provided that—

1. The hours of actual work do not exceed ten and a half hours in any one day;

2. The hours of actual work do not exceed sixty hours in any one week, such week to be reckoned between midnight on Saturday night and midnight on the succeeding Saturday night;
3. Reasonable intervals for meals, amounting in the whole to not less than the amount of time required for such intervals by the Factory Acts, shall be allowed to such woman or young person;
4. No such woman or young person shall be so employed between seven o'clock in the evening and five o'clock next morning:

Provided that, for the purpose only of preventing any damage which may arise from spontaneous combustion in the process of turkey-red dyeing, or from any extraordinary atmospheric influence in the process of open-air bleaching, women and young persons may be employed so far as is necessary for the purpose of preventing such damage.

7. Whereas the exigencies of the processes of turkey-red dyeing require that the hours between which young persons and women, or certain sets of them, may be employed should be varied so as to correspond to the accustomed hours of the trade: It is hereby declared that it shall be lawful for one of Her Majesty's principal Secretaries of State from time to time, by order, to be advertised in the *London Gazette*, or otherwise published in such manner as he may think fit, to give permission that in the case of any particular factory or class of factories in which the process of turkey-red dyeing is carried on, young persons and women, or any of them, or any sets of them, or of any of them, may, during the time specified in the order, or until further order, or on any day or days named in such order, be employed in such process between the hours specified in the order instead of between the hours prescribed by the Factory Acts; and, so far as respects the persons referred to in any such order, the Factory Acts shall, during the continuance of such order, be read as if the hours specified in the order were throughout such Acts substituted for the hours prescribed by the Factory Acts:

Provided that—

1. No young person or woman shall be employed in pursuance of such order after half past four o'clock in the afternoon of Saturday;
2. Notice of the hours between which women and young persons are to be employed in pursuance of this modification, in such form as the inspectors of factories may direct, and signed by one of such inspectors, and the occupier or his agent, shall, during the continuance of the order, be kept hung up in such conspicuous place in the factory as may be required by one of such inspectors.

8. Where, under the modifications contained in any schedule to the principal Act or to this Act, any child, young person, or woman is employed otherwise than under an order of the Secretary of State, during any hours different from those of the Factory Acts, the day on which and the period during which he or she is so employed shall be entered by the occupier of the factory in a register, which shall be in such form as the inspectors of factories may direct, and shall be deemed to be a register within the meaning of the Factory Acts.

SECOND SCHEDULE.

PERMANENT MODIFICATION.

In the manufacture of preserves from fruit, and in the processes of preserving or curing fish, women may be employed between the 1st of June and the 24th day of December for a period not exceeding fourteen hours on any one day:

Provided that—

1st. They shall not be so employed except between the hours of six in the morning and eight in the evening, or in a factory in which permission has been given by the Secretary of State to work between the hours of seven in the morning and seven in the evening, or of eight in the morning and eight in the evening, then except between the hours of seven in the morning and nine in the evening, or eight in the morning and ten in the evening, as the case may be;

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of five in the evening;

3rd. They shall not be so employed on the whole for more than ninety-six days during the said period between the 1st day of June and the 24th day of December;

4th. They shall not be so employed for more than five consecutive days in any one week.

THE WORKSHOP REGULATION ACT, 1867.

(30 & 31 Vict. c. 146.)

General Definitions.

Section 4.—The following words and expressions shall in this Act have the meanings hereby assigned to them, unless there is something in the context inconsistent with such meanings; that is to say:—

"Child" shall mean a child under the age of thirteen years:

"Young person" shall mean a person of the age of thirteen years and under the age of eighteen years:

"Woman" shall mean a female of the age of eighteen years or upwards:

"Parent" shall mean parent, guardian, or person having the custody of or control over any such child or young person:

"Employed" shall mean occupied in any handicraft, whether for wages or not, under a master or under a parent as herein defined:

"Handicraft" shall mean any manual labour exercised by way of trade or for purposes of gain in or incidental to the making any article or part of an article, or in or incidental to the altering, repairing, ornamenting, finishing, or otherwise adapting for sale ony article:

"Workshop" shall mean any room or place whatever, whether in the open air or under cover, in which any handicraft is carried on by any child, young person, or woman, and to which and over which the person by whom such child, young person, or woman is employed has the right of access and control:

"The court" shall include any justice or justices, sheriff or sheriff substitute, magistrate or magistrates, to whom jurisdiction is given by this Act.

Application of Act.

Section 5.—This Act shall not apply—

(1) To any factory or part of a factory, or other place subject to the jurisdiction of the inspectors of factories, in pursuance of any Act of Parliament already passed or which shall be passed during this present session of Parliament;

(2) To any bakehouse as defined by the Bakehouse Regulation Act, 1863.

Regulations as to Time of Labour.

Section 6.—Subject to the exceptions mentioned in the first schedule annexed hereto, the following regulations

shall be observed with respect to the employment of children, young persons, and women in workshops :—

(1) No child under the age of eight years shall be employed in any handicraft :

(2) No child shall be employed on any one day in any handicraft for a period of more than six and a half hours, and such employment shall take place between the hours of six in the morning and eight at night :

(3) No young person or woman shall be employed in any handicraft during any period of twenty-four hours for more than twelve hours, with intervening periods for taking meals and rest amounting in the whole to not less than one hour and a half, and such employment shall take place only between the hours of five in the morning and nine at night :

(4) No child, young person, or woman shall be employed in any handicraft on Sunday, or after two o'clock on Saturday afternoon, except in cases where not more than five persons are employed in the same establishment, and where such employment consists in making articles to be sold by retail on the premises, or in repairing articles of a like nature to those sold by retail on the premises :

(5) No child under the age of eleven years shall be employed in grinding in the metal trades or in fustian cutting.

Penalty for Employment of Children, Young Persons, and Women contrary to the Provisions of this Act.

Section 7.—If any child, young person, or woman is employed in contravention of this Act, the following consequences shall ensue :—

First.—The occupier of the workshop in which such child, young person, or woman is employed shall be liable to a penalty of not more than three pounds :

Second.—The parent of or the person deriving any direct benefit from the labour of or having the control over the child, young person, or woman,

shall be liable to a penalty of not more than twenty shillings, unless it appears to the court before whom the complaint is heard that the offence has been committed without the consent, connivance, or wilful default of the parent or person so benefited or having such control.

Provision with respect to Use of Fan in Grinding.

Section 8.—In every workshop where grinding, glazing, or polishing on a wheel or any other process is carried on by which dust is generated and inhaled by the workmen to an injurious extent, if it appears to the local authority or to any inspector of factories that such inhalation could be to a great extent prevented by the use of a fan or other mechanical means, it shall be lawful for the local authority or for the inspector of factories, by notice served on the occupier of the workshop in the manner in which notices given by such local authority or by the inspector of factories are usually served, to require a fan or such mechanical means as may from time to time be approved by one of Her Majesty's principal Secretaries of State, under the provisions of the Factory Acts, to be provided by the occupier of the workshop within a reasonable time.

If the occupier of any workshop fails to provide a fan or other mechanical means in compliance with a notice served on him in manner aforesaid, he shall be deemed to be guilty of an offenc against this Act, and to be subject in respect of such offence to a penalty not exceeding ten pounds nor less than three pounds.

The court having jurisdiction to inflict any penalty under this Act may, in addition to or instead of inflicting such penalty in respect of an offence under this section, make an order directing that within a certain time to be named in such order he do provide such fan or other mechanical means: the court may, upon application enlarge any time appointed for the adoption of the means directed by the order, but any non-compliance with the order of the court shall, after the expiration of the time as originally limited or enlarged by subsequent order, be deemed to be a continuing offence, and to be punishable by a penalty not exceeding one pound for every day that such non-compliance continues.

Power to Officers appointed by Local Authority, &c. to enter Workshops.

Section 9.—If on the complaint of any *officer of health*, inspector of nuisances, or other officer appointed by a local authority, or of any superintendent of police, it appears to any justice of the peace that there is reasonable cause for believing that any of the provisions of this Act, or of the Sanitary Act, 1866, are contravened in any workshop, it shall be lawful for such justice by order under his hand to empower the complainant to enter into such workshop, at any time within forty-eight hours from the date of such order, and to examine such workshop. And any person so empowered may examine touching any matter within the provisions of this Act, or of the Sanitary Act, 1866, or so far as relates to such workshop, any person whom he finds in such workshop.

Penalty on Persons refusing Admission.

Any person refusing admission to any person so empowered, or obstructing him in the discharge of his duty, shall for each offence incur a penalty not exceeding twenty pounds.

[This clause is now transferred to the inspectors of the Factory Acts.]

Power to Inspector or Sub-Inspector of Factories to enter Workshops and inspect Condition thereof.

Section 10.—Any inspector or sub-inspector of factories may, when any person is at work at any handicraft, enter any workshop and inspect the conditon thereof, and examine, touching any matter within the provisions of this Act or of the Sanitary Act, 1866, so far as relates to such workshop, the persons therein, provided that he report to one of Her Majesty's principal Secretaries of State the fact of such entry, and the condition of the workshop, in his next half-yearly report.

Penalty on obstructing Inspector, &c.

Any person obstructing any inspector or sub-inspector in making such entry as aforesaid, or in his inspection of a

workshop, shall for each offence be liable to a penalty not exceeding twenty pounds.

Liability of Hirer of Machine instead of Occupier.

Section 11.—Where in any workshop the owner or hirer of any machine or implement moved by steam, water, or other mechanical power, in or about or in connection with which machine or implement children, young persons, or women are employed, is some person other than the occupier of the workshop, and such children, young persons, or women are in the employment and pay of the owner or hirer of such machine or implement, in any such case such owner or hirer shall, so far as respects any offence against this Act which may be committed in relation to such children, young persons, or women, be deemed to be the occupier of the workshop.

Local Authority to enforce Act.

Section 18.—It shall be the duty of the local authority to enforce within their jurisdictions the provisions of this Act, so far as relates to any powers or authorities conferred on the local authority by this Act, and all expenses incurred by them in enforcing the same may be defrayed out of any funds in their hands, or any rates leviable by them and applicable to any purpose relating to the improvement, paving, cleansing, or management of the places within their jurisdiction, or, in cases where the local authority is in the receipt of any poor rate, out of any such rate.

Provision as to pleading that Workshop is a Factory.

Section 19.—Where any proceedings are taken against any person in respect of any offence under this Act committed in or relating to a workshop, it shall not be competent for the defendant to prove that such workshop is a factory within the meaning of any Act for regulating factories, unless he has previously given notice of its being a factory to the inspector of factories in manner required by any Act of Parliament in that behalf.

Inspector or Sub-Inspector to be furnished with Certificate of his Appointment.

Section 20.—Every inspector or sub-inspector of factories

shall be furnished with such certificate of his appointment as the Secretary of State may direct; and on applying for admission to any workshop, such inspector or sub-inspector shall, if required, produce to the occupier the said certificate; every person who forges or counterfeits any such certificate, or makes use of any forged, counterfeited, or false certificate, or falsely pretends to be an inspector or sub-inspector of factories, shall be guilty of a misdemeanour, and be liable to be imprisoned for any period not exceeding three months, with or without hard labour.

FIRST SCHEDULE.

PERMANENT EXCEPTIONS.

6. Whereas the customs or exigencies of certain trades require that male young persons of the age of sixteen years and upwards should be occasionally employed beyond the hours allowed by this Act: It shall be lawful for one of Her Majesty's principal Secretaries of State, on due proof to his satisfaction that such customs or exigencies exist, and that such occasional employment is not injurious to the health of such male young persons, from time to time, by order, to be advertised in the *London Gazette*, or otherwise published in such manner as he may think fit, to give permission that in the case of any particular workshop or class of workshops male young persons of sixteen years of age and upwards may be employed for a period not exceeding fifteen hours on any one day:

Provided that—

1st. They are not so employed except between the hours of six in the morning and nine in the evening;

2nd. In addition to the time allowed under this Act for meals, they shall be allowed half an hour for a meal after the hour of five in the evening;

3rd. They are not so employed for more than twelve days in any period of four weeks, nor on the whole for more than seventy-two days in any period of twelve months.

7. In any workshop in which the mechanical power is water, and in any workshop or class of workshops with respect to which one of Her Majesty's principal Secretaries of State certifies by order under his hand that it has been proved to his satisfaction that by reason of the nature of the business it is necessary to carry on the same throughout the night, it shall be lawful to employ male young persons during the night, subject to the same intervals of rest which they are allowed during the day, and subject to this provision, that no male young

persons employed during the night shall be employed during either the preceding or succeeding day, and that no male young person shall be employed more than six nights in any fortnight.

For the purposes of the last-mentioned provision, night shall mean any time between six o'clock in the afternoon of one day and six o'clock of the morning of the following day.

8. So much of this Act as forbids the employment of young persons and women on any Saturday after two o'clock of the afternoon shall not apply to male young persons employed in day and night turns, changing every alternate week, nor in any week to any woman or young person whose hours of actual work have not in any day in such week exceeded eight.

9. The said Secretary of State, on proof to his satisfaction that the customs or exigencies of trade, or any other special circumstances, require the alteration to be made, may, by order to be advertised in the *London Gazette*, or otherwise published in such manner as the Secretary of State may think fit, give permission, with respect to any particular workshop or class of workshops, for all or any of the following things; namely:—

(1) That children, young persons, or women may be employed between two and eight o'clock in the afternoon on Saturday, provided that in any such workshop or workshops arrangements are made to the satisfaction of the said Secretary of State for giving on some work-day in every week to every child, young person, or woman employed a half-holiday of equal length, either at the beginning or at the end of their day's work; or

(2) That in any workshop in which it is proved to his satisfaction that work does not commence before the hours of seven or eight in the morning, children, young persons, and women may be employed on Saturday, or on any other day on which the weekly half-holiday is given, from the hours of seven in the morning to three in the afternoon, or from eight in the morning to four in the afternoon, subject to the usual hours for meals;

(3) That male young persons of not less than sixteen years of age may be employed in the same manner as if they were male persons exceeding the age of eighteen.

10. Where the occupier of any workshop is a person of the Jewish religion, and it is his custom to keep such workshop closed on Saturday until sunset, it shall be lawful for him to employ young persons or women on that day from after sunset until nine o'clock at night.

CHAPTER VII.

DANGEROUS SUBSTANCES USED IN TRADES.

VARIOUS Acts of Parliament have been passed with a view to regulate the storing and sale of highly explosive or poisonous substances, with which the medical officer of health should be familiar.

EXPLOSIVE COMPOUNDS.

THE GUNPOWDER, ETC. ACT AMENDMENT ACT, 1861. (24 & 25 Vict. c. 130.)

Transfer of Licensing Powers.

Section 1.—All powers of granting licenses by the said Act given to justices of the peace at their general quarter sessions shall be transferred to and vested in the justices in petty sessions assembled; and the justices shall hold special petty sessions of the peace in their several divisions for granting such licenses at such times as they think expedient; and all powers thereby transferred shall be exercised by the justices in petty sessions assembled within their respective divisions in the same manner in which the same are by the said Act required to be exercised by the justices at their general quarter sessions, or as near thereto as circumstances will admit.

Table of Fees.

Section 2.—The justices in each petty sessional division may, with the sanction of one of Her Majesty's principal Secretaries of State, regulate the mode in which appli-

cations for licenses under this Act are to be made, and make a scale of fees to be charged in respect of such licenses.

Construction of Act.

Section 3.—This Act, so far as is consistent with the tenor thereof, shall be construed as one with the said Act of the 23rd and 24th years of the reign of Her present Majesty, chapter 139.

Section 18 of Recited Act to apply to Manufacturers of Safety Fuzees.

Section 4.—And whereas it is necessary for the manufacturers of safety fuzees to have and keep for the purpose of such manufacture large quantities of gunpowder: Be it enacted that such manufacturers shall be within and subject to all the provisions of the 18th section of the said recited Act, in like manner as the manufacturers of cartridges, fireworks, and rockets; and, further, that it shall be lawful for such manufacturers of safety fuzees to keep exclusively for the use of such manufacture the respective quantities of gunpowder mentioned in the 19th section of the said Act, in like manner as the same may be kept for the use of any mine, quarry, or colliery, but subject to all the restrictions and conditions mentioned and provided in the said section.

The Carriage and Deposit of Dangerous Goods Act, 1866.

(29 & 30 Vict. c. 69.)

Nitro-glycerine to be Deemed Dangerous.

Section 1.—The goods or article commonly known as nitro-glycerine or glonoine oil shall be deemed to be specially dangerous within the meaning of this Act.

Other Goods may be Declared so by Order in Council.

Section 2.—Her Majesty may from time to time, by Order in Council, declare that any goods named in any such order (other than nitro-glycerine or glonoine oil) are to be

deemed specially dangerous within the meaning of this Act; and may from time to time amend or repeal any such order; and any goods which are by any such order declared to be specially dangerous shall, so long as such order is in force, be deemed to be specially dangerous within the meaning of this Act.

Such Goods to be Marked, and Notice to be given of their Character.

Section 3.—No person shall deliver any goods which are specially dangerous to any warehouse owner or carrier, or send or carry, or cause to be sent or carried, any such goods upon any railway or in any ship to or from any part of the United Kingdom, or in any other public conveyance, or deposit any such goods in or on any warehouse or quay, unless the true name or description of such goods, with the addition of the words, "Specially dangerous," is distinctly written, printed, or marked on the outside of the package, nor in the case of delivery to or deposit with any warehouse owner or carrier, without also giving notice in writing to him of the name or description of such goods, and of their being specially dangerous. And any person who commits a breach of this enactment shall be liable to a penalty not exceeding five hundred pounds, or at the discretion of the court to imprisonment, with or without hard labour, for any term not exceeding two years.

Provision for Case of Absence of Knowledge of Nature of Goods.

Section 4.—Provided always, as follows:

(1) Any person convicted of a breach of the last foregoing enactment shall not be liable to imprisonment, or to a penalty of more than two hundred pounds, if he shows to the satisfaction of the court and jury before whom he is convicted that he did not know the nature of the goods to which the indictment relates;

(2) Any person accused of having committed a breach of the said enactment shall not be liable to be

convicted thereof if he shows to the satisfaction of the court and jury before whom he is tried that he did not know the nature of the goods to which the indictment relates, and that he could not, with reasonable diligence, have obtained such knowledge.

As to Forfeiture of such Goods.

Section 5.—Where goods are delivered, sent, carried, or deposited in contravention of the said enactment, the same shall be forfeited, and shall be disposed of in such manner as the Commissioners of Her Majesty's Treasury or (in case of importation) the Commissioners of Customs direct, whether any person is liable to be convicted of a breach of the said enactment or not.

Warehouse Owners, &c. not Bound to Receive such Goods.

Section 6.—No warehouse owner or carrier shall be bound to receive or carry any goods which are specially dangerous.

Interpretation of Owner and Carrier.

Section 7.—In construing this Act the term "warehouse owner" shall include all persons or bodies of persons owning or managing any warehouse, store, quay, or other premises in which goods are deposited; and the word "carrier" shall include all persons or bodies of persons carrying goods or passengers for hire by land or water.

Short Title.

Section 10.—This Act may be cited as "The Carriage and Deposit of Dangerous Goods Act, 1866."

THE NITRO-GLYCERINE ACT, 1869.

(32 & 33 Vict. c. 113.)

Short Title.

Section 1.—This Act may be cited for all purposes as "The Nitro-glycerine Act, 1869."

Interpretation of Terms.

Section 2.—In the interpretation of this Act—

"Nitro-glycerine" means the substance called or known by that name, or as glonoine oil, and this Act extends to every substance having nitro-glycerine in any form as one of its component parts or ingredients in the same manner as if it were nitro-glycerine;

"Court" includes any justices, sheriff, or magistrate exercising jurisdiction under the powers of this Act;

"Person" includes body corporate.

Prohibition of Importation and Exportation of Nitro-glycerine.

Section 3.—Save as hereinafter mentioned, no person shall, after the passing of this Act, bring into any port or harbour of the United Kingdom, or ship or unship on, from, or near the coasts of any part of the United Kingdom, any nitro-glycerine.

If any person acts in contravention of this section, he shall be guilty of a misdemeanour, and shall, at the discretion of the court, be liable to be imprisoned, with or without hard labour, for any term not exceeding one year, or to pay a penalty not exceeding five hundred pounds; and all nitro-glycerine brought into any port or harbour or shipped or unshipped in contravention of this section shall be forfeited.

If it is shown to the satisfaction of one of Her Majesty's principal Secretaries of State that any substance having nitro-glycerine in any form as one of its component parts or ingredients can safely be brought into any port or harbour of the United Kingdom, or be safely shipped or unshipped on, from, or near the coasts of any part of the United Kingdom, he may by general or special license authorise the introduction or exportation of such substance into or from the United Kingdom on such conditions as he thinks expedient.

No penalty shall be inflicted in pursuance of this section on any person bringing nitro-glycerine into any port or harbour of the United Kingdom who proves to the satisfaction of the court before which he is tried that he was

driven into such port or harbour by stress of weather, that with as little delay as possible he gave notice to the authorities having jurisdiction in such port or harbour of the arrival of the ship bringing nitro-glycerine, and that he conformed to any directions which may have been given him by such authorities.

Regulation as to the Manufacture, Sale, and Carriage of Nitro-glycerine.

Section 4.—No person shall, after the expiration of four weeks from the passing of this Act, manufacture, sell, carry, or otherwise dispose of or have in his possession any nitro-glycerine in any part of the United Kingdom, except in accordance with a general or special license issued by one of Her Majesty's principal Secretaries of State; the said Secretary of State may annex any absolute prohibitions or any restrictions to any license granted by him in pursuance of this Act, limiting the manufacture, sale, carriage, disposal, or storage of nitro-glycerine to particular persons, and to particular places, and for particular purposes, or otherwise prohibiting or restricting the manufacture or use thereof in such manner as he thinks fit; he may also, in any case where he allows nitro-glycerine to be carried, prohibit the carriage thereof along any public way, and add restrictions as to the persons by whom, the mode in which, the places from and to which, and the quantity in which any nitro-glycerine is to be carried, and generally may make such provisions and restrictions, whether relating to the matters aforesaid, or any of them, as he thinks fit for the protection of the public against the danger arising from the manufacture, sale, carriage, disposal, or storage of nitro-glycerine.

If any person manufactures, sells, carries, or otherwise disposes of or has in his possession any nitro-glycerine without a general or special license in pursuance of this Act, he shall be guilty of a misdemeanour, and shall in the discretion of the court be liable to be imprisoned, with or without hard labour, for any period not exceeding one year, or to pay a penalty not exceeding five hundred pounds.

The said Secretary of State may annex to the breach of the conditions of any license granted by him any punish-

ment or penalty, not being greater than the punishment or penalty to which a person manufacturing, selling, carrying, disposing of, or having in his possession any nitro-glycerine without a general or special license is made liable by this Act; and any pecuniary penalty so annexed may be recovered summarily if it does not exceed one hundred pounds:

Provided that no penalty shall be inflicted in pursuance of this Act on any carrier, wharfinger, or warehouseman who satisfies the court that after using all due precautions the nitro-glycerine was carried by him or was in his possession without his knowledge.

Provisions as to Persons having Nitro-glycerine in their Possession at the Commencement of the Act.

Section 5.—Every person having any nitro-glycerine in his possession at the time at which this Act is passed shall give notice thereof in writing to the said Secretary of State, stating such particulars in relation to the quantity, storage, and otherwise as the said Secretary of State may require; and the said Secretary of State may thereupon make such order in respect to the disposal thereof as he thinks just.

Any person failing to give such notice as required by this section will be subject to the same punishment and penalty to which a person manufacturing, selling, carrying, disposing of, or having in his possession any nitro-glycerine without a license is made liable by this Act.

Search for Nitro-glycerine.

Section 6.—Nitro-glycerine may be searched for in the same manner, under the same warrants, and subject to the same conditions in, under, and subject to which gunpowder may be searched for in pursuance of the Act of the session of the 23rd and 24th years of the reign of Her present Majesty, chapter 139; and all the provisions of the said Act relating to searching for gunpowder are hereby incorporated with this Act, and shall for the purposes of this Act be construed as if the word "gunpowder" in such provisions included nitro-glycerine as defined by this Act, and as if the Act therein referred to were this Act, and those provisions shall be construed to extend to nitro-glycerine imported or sold contrary to this Act.

A highly explosive compound of nitro-glycerine is now largely sold under the name of *Lithofracteur.*

The Petroleum Act, 1871.

(34 & 35 Vic. c. 105.)

[Continued till 1874 by 35 & 36 Vict. c. 88.]

Short Title.

Section 1.—This Act may be cited as "The Petroleum Act, 1871."

Interpretation of certain Terms in the Act.

Section 2.—In this Act, if not inconsistent with the context, the following terms have the meanings hereinafter assigned to them (that is to say):—

The term "borough" means—

In England any place for the time being subject to the provisions of the Act of the session of the 5th and 6th years of the reign of King William IV. chapter 76, "to provide for the Regulation of Municipal Corporations in England and Wales," and the Acts amending the same;

In Scotland any royal burgh and any burgh or town returning or contributing to return a member or members to serve in Parliament;

In Ireland any place for the time being subject to the provisions of the Act of the session of the 3rd and 4th years of the reign of Her present Majesty, chapter 108, "for the Regulation of Municipal Corporations in Ireland," and the Acts amending the same:

The term "person" includes a body corporate:

The term "Secretary of State" means one of Her Majesty's principal Secretaries of State:

The term "Lord Lieutenant" means the Lord Lieutenant of Ireland, or the lords justices or other chief governors or governor of Ireland for the time being:

The term "harbour" means any harbour properly so called, whether natural or artificial, and any port, haven, estuary, tidal river or other river, canal or inland navigation navigated by sea-going ships, and any dock,

pier, jetty, or other works in or at which ships do or can ship or unship goods or passengers:

The term "harbour authority" includes any persons or person being or claiming to be proprietors or proprietor of or entrusted with the duty or invested with the power of improving, maintaining, or managing any harbour:

The term "ship" includes every description of vessel used in navigation, whether propelled by oars or otherwise:

The term "Summary Jurisdiction Acts" means as follows:

As to England, the Act of the session of the 11th and 12th years of the reign of Her present Majesty, chapter 43, intituled "An Act to Facilitate the Performance of the Duties of Justices of the Peace out of Sessions within England and Wales with respect to Summary Convictions and Orders," and any Acts amending the same;

As to Scotland, the Summary Procedure Act, 1864:

As to Ireland, within the police district of Dublin metropolis, the Acts regulating the powers and duties of justices of the peace for such district, or of the police of such district; and elsewhere in Ireland, the Petty Sessions (Ireland) Act, 1851, and any Act amending the same:

The term "court of summary jurisdiction" means and includes any justice or justices of the peace, sheriff or sheriff substitute, metropolitan police magistrate, stipendiary or other magistrate, or officer, by whatever name called, to whom jurisdiction is given by the Summary Jurisdiction Acts or any Acts therein referred to, or to proceedings before whom the provisions of the Summary Jurisdiction Acts are or may be made applicable:

The term "county rate" means as regards Scotland the county general assessment leviable in pursuance of the County General Assessment (Scotland) Act, 1868, and as regards Ireland, the grand jury cess.

Definition of Petroleum and Application of Act.

Section 3.—For the purposes of this Act the term "petroleum" includes any rock oil, Rangoon oil, Burmah oil, oil made from petroleum, coal, schist, shale, peat, or other bitu-

minous substance, and any products of petroleum, or any of the above-mentioned oils; and the term "petroleum to which this Act applies" means such of the petroleum so defined as, when tested in manner set forth in Schedule I. to this Act, gives off an inflammable vapour at a temperature of less than 100 degrees of Fahrenheit's thermometer.

Regulations as to Storage of Petroleum.

Section 7.—Save as hereinafter mentioned, after the passing of this Act, petroleum to which this Act applies shall not be kept, except in pursuance of a license given by such local authority as is in this Act mentioned.

All petroleum kept in contravention of this section shall, together with the vessel containg the same, be forfeited, and in addition thereto the occupier of the place in which such petroleum is so kept shall be liable to a penalty not exceeding twenty pounds a day for each day during which such petroleum is so kept.

This section shall not apply to any petroleum kept either for private use or for sale, provided the following conditions are complied with:—

(1) That it is kept in separate glass, earthenware, or metal vessels, each of which contains not more than a pint, and is securely stopped;

(2) That the aggregate amount kept, supposing the whole contents of the vessels to be in bulk, does not exceed three gallons.

Definition of Local Authority.

Section 8.—The following bodies shall respectively be the local authority to grant licenses under this Act in the districts hereinafter mentioned (that is to say):—

(1) In the City of London, except as hereafter in this section mentioned, the court of the Lord Mayor and aldermen of the said city;

(2) In the metropolis (that is, in places for the time being within the jurisdiction of the Metropolitan Board of Works under the Metropolis' Management Act, 1855), except the City of London, and except as hereafter in this section mentioned, the Metropolitan Board of Works;

(3) In any borough in England or Ireland, except as hereafter in this section mentioned, the mayor, aldermen, and burgesses acting by the council;

(4) In any place in England or Ireland, except as hereafter in this section mentioned, within the jurisdiction of any trustees or improvement commissioners appointed under the provisions of any local or general Act of Parliament, and not being a borough or comprising any part of a borough, the trustees or commissioners;

(5) In any place in England (except as hereafter in this section mentioned) within the jurisdiction of a local board constituted under the Local Government Act, 1858, and not being any of the districts before mentioned or comprising any part of any such district, the local board;

(6) In any borough in Scotland, except as hereafter in this section mentioned, the town council;

(7) In any place in Scotland, except as hereafter in this section mentioned, within the jurisdiction of police commissioners or trustees exercising the functions of police commissioners under any general or local Act, and not being a borough or comprising any part of a borough, the police commissioners or trustees;

(8) In any harbour within the jurisdiction of a harbour authority, whether situate or not within the jurisdiction of any local authority before in this section mentioned, the harbour authority, to the exclusion of any other local authority;

(9) In any place in which there is no local authority as before in this section defined, in England or Ireland, the justices in petty sessions assembled, and in Scotland any two or more justices of the peace for the county sitting as judges in the justice of peace court.

Mode of granting Licenses.

Section 9.—Licenses in pursuance of this Act shall be valid if signed by two or more of the persons constituting the local authority, or executed in any other way in which other

licenses, if any, granted by such authority are executed. Licenses may be granted for a limited time, and may be subject to renewal or not in such manner as the local authority think necessary.

There may be annexed to any such license such conditions as to the mode of storage, the nature and situation of the premises in which and the nature of the goods with which petroleum to which this Act applies is to be stored, the facilities for the testing of such petroleum from time to time, the mode of carrying such petroleum within the district of the licensing authority, and generally as to the safe keeping of such petroleum as may seem expedient to the local authority.

Any licensee violating any of the conditions of his license shall be deemed to be an unlicensed person. There may be charged in respect of each license granted in pursuance of this Act such sum, not exceeding 5*s*., as the local authority may think fit to charge.

In case of Refusal of License the Applicant may memorialise Secretary of State or Lord Lieutenant.

Section 10.—If on any application for a license under this Act the local authority refuse the license or grant the same only on conditions with which the applicant is dissatisfied, the local authority shall, if required by the applicant, deliver to him in writing under the hand or hands of one or more of the persons constituting the local authority, a certificate of the grounds on which they refused the license or annexed conditions to the grant thereof.

The applicant within ten days from the time of the delivery of the certificate may transmit the same to a Secretary of State if the application is for a license in England or Scotland, and to the Lord Lieutenant if the application is for a license in Ireland, together with a memorial, praying that notwithstanding such refusal the license may be granted or that the conditions may not be imposed, or may be altered or modified in such manner and to such extent as may be set forth in such memorial.

It shall be lawful for the Secretary of State, or the Lord Lieutenant, if he think fit, on consideration o such memorial and certificate, and, if he think it necessary or desirable,

after due enquiry and a report by such person as he may appoint for that purpose, to grant the license prayed for, either absolutely or with such conditions as he thinks fit, or to alter or modify the conditions imposed by the local authority; and the license so granted, or altered and modified, as the case may be, when certified under the hand of a Secretary of State, or the Lord Lieutenant, shall be to all intents as valid as if granted by the local authority.

Testing of Petroleum by Officer of Local Authority.

Section 11.—Any officer authorised by the local authority may purchase any petroleum from any dealer in it, or may, on producing a copy of his appointment, purporting to be certified by the clerk or some member of the local authority, or producing some other sufficient authority, require the dealer to show him every or any place, and all or any of the vessels in which any petroleum in his possession is kept, and to give him samples of such petroleum on payment of the value of such samples.

When the officer has by either of the means aforesaid taken samples of petroleum, he may declare in writing to the dealer that he is about to test the same, or cause the same to be tested, in manner set forth in Schedule I. to this Act, and it shall be lawful for him to test the same or cause the same to be tested, at any convenient place, at such reasonable time as he may appoint, and the dealer or any person appointed by him may be present at the testing, and if it appear to the officer or other person so testing that the petroleum from which such samples have been taken is petroleum to which this Act applies, such officer or other person may certify such fact, and the certificate so given shall be receivable as evidence in any proceedings that may be taken against a dealer in petroleum in pursuance of this Act; but it shall be lawful for a dealer proceeded against to give evidence in proof that such certificate is incorrect, and thereupon the court before which any such proceedings may be taken may, if such court think fit, appoint some person skilled in testing petroleum to examine the samples to which such certificate relates, and to declare whether such certificate is correct or incorrect.

Any expenses incurred in testing any petroleum of such dealer in pursuance of this section shall, if such dealer be

convicted of keeping, sending, conveying, selling, or exposing for sale, petroleum in contravention of this Act, be deemed to be a portion of the costs of the proceedings against him, and shall be paid by him accordingly. In any other event such expenses shall be paid by the local authority out of any funds for the time being in their hands, and in case the local authority are the justices, out of the county rate.

Penalty for Refusing Information and Obstructing Officer.

Section 12.—Any dealer who refuses to show to any officer authorised by the local authority every or any place or all or any of the vessels in which petroleum in his possession is kept, or to give him such assistance as he may require for examining the same, or to give to such officer samples of such petroleum on payment of the value of such samples, or who wilfully obstructs the local authority, or any officer of the local authority, in the execution of this Act, shall incur a penalty not exceeding twenty pounds.

Search for Petroleum.—See 23 & 24 *Vict. c.* 139, *s.* 25.

Section 13.—Where any court of summary jurisdiction is satisfied by information on oath that there is reasonable ground to believe that any petroleum to which this Act applies is being kept, sent, conveyed, or exposed for sale within the jurisdiction of such court in contravention of this Act, at any place, whether a building or not, or in any ship or vehicle, such court shall grant a warrant by virtue whereof it shall be lawful for any person named in such warrant to enter the place, ship, or vehicle named in such warrant, and every part thereof, and examine the same and search for petroleum therein, and take samples of any petroleum found therein, and if any petroleum to which this Act applies be found therein, which is kept, sent, conveyed, or exposed for sale, in contravention of this Act, to seize and remove such petroleum, and the vessel containing the same, and to detain such petroleum and vessel until some court of summary jurisdiction has determined whether the same are or not forfeited, the proceedings for which forfeiture shall be commenced forthwith after the seizure.

Any person seizing any petroleum to which this Act

applies in pursuance of this section shall not be liable to any suit for detaining the same, or for any loss or damage incurred in respect of such petroleum, otherwise than by any wilful act or neglect while the same is so detained.

If any petroleum to which this Act applies is seized in pursuance of this section in any ship or vehicle, the person seizing the same may use for the purposes of the removal thereof, during twenty-four hours after the seizure, the said ship or vehicle, with the tackle, beasts, and accoutrements belonging thereto, and, if he do so, shall pay to the owner thereof a reasonable recompense for the use thereof, and the amount of such recompense shall, in case of dispute, be settled by the court of summary jurisdiction before whom proceedings for the forfeiture are taken, and may be recovered in like manner as penalties under this Act may be recovered.

Any person who, by himself or by anyone in his employ, or acting by his direction or with his consent, refuses or fails to admit into any place occupied by or under the control of such person, any person demanding to enter in pursuance of this section, or in any way obstructs or prevents any person in or from making any such search, examination, or seizure, or taking any such samples as authorised by this section, shall be liable to pay a penalty not exceeding twenty pounds, and to forfeit all petroleum to which this Act applies which is found in his possession or under his control.

Application of Act to other Substances.

Section 14.—Her Majesty may from time to time make, revoke, and vary Orders in Council directing this Act or any part thereof to apply to any substance, and this Act, or the part thereof specified in the order shall, during the continuance of the order, apply to such substance, and shall be construed and have effect as if throughout it such substance had been included in the definition of petroleum to which this Act applies, subject to the following qualifications:—

(1) The quantity of any substance to which this Act is directed by Order in Council to apply, which may be kept without a license, shall be such quantity only as is specified in that behalf in such order, or

if no such quantity is specified, no quantity may be kept without a license;

(2) The label on the vessel containing such substance shall be such as may be specified in that behalf in the order.

Summary Proceedings for Offences, Penalties, &c.

Section 15.—In England and Ireland all offences and penalties under this Act, and all money and costs directed by this Act to be recovered as penalties may be prosecuted and recovered in manner provided by the Summary Jurisdiction Acts.

In Scotland all offences and penalties under this Act, and all money and expenses by this Act directed to be recovered as penalties, shall, save as hereinafter provided, be prosecuted and recovered at the instance of the procurator fiscal or of any officer authorised in that behalf by the harbour authority or local authority under the provisions of the Summary Jurisdiction Acts before a court of summary jurisdiction, and all necessary powers and jurisdictions are hereby conferred on such court in Scotland:

Provided as follows:—

1. A court of summary jurisdiction shall not impose a penalty exceeding fifty pounds, but any such court may impose that or any less penalty for any one offence, notwithstanding the offence involves a penalty of higher amount.

2. In Scotland any penalty exceeding fifty pounds shall be recovered and enforced in the same manner in which any penalty due to Her Majesty under any Act of Parliament may be recovered and enforced.

3. The court of summary jurisdiction, when hearing and determining an information or complaint, shall be constituted in some one of the following manners; that is to say:—

(*a*) In England, either of two or more justices of the peace in petty sessions sitting at a place appointed for holding petty sessions, or of one of the magistrates hereinafter mentioned sitting alone or with others at some court or other place appointed for the administration of justice; that is to say, the Lord Mayor or any alderman of the City of Lon-

don, a metropolitan police magistrate, a stipendiary magistrate, or some other officer or officers for the time being empowered by law to do alone or with others any act authorised to be done by more than one justice of the peace;

(*b*) In Scotland, of two or more justices of the peace sitting as judges in a justice of the peace court, or of one of the magistrates hereinafter mentioned sitting alone or with others at some court or other place appointed for the administration of justice; that is to say, the sheriff of the county or his substitute, or the provost or other magistrate of a royal burgh, or some other officer or officers for the time being empowered by law to do alone or with others any act authorised to be done by more than one justice of the peace;

(*c*) In Ireland, within the police district of Dublin metropolis, of one of the divisional justices of the police district of Dublin metropolis, sitting at a police court within the said district; and elsewhere, of a stipendiary magistrate sitting alone or with others, or of two or more justices of the peace in petty sessions sitting at a place appointed for holding petty sessions.

4. The description of any offence under this Act in the words of such Act shall be sufficient in law.

5. Any exception, exemption, proviso, excuse, or qualification, whether it does or not accompany the description of the offence in this Act, may be proved by the defendant, but need not be specified or negatived in the information, and if so specified or negatived, no proof in relation to the matters so specified or negatived shall be required on the part of the informant or prosecutor.

6. No conviction or order made in pursuance of this Act shall be quashed for want of form or be removed by certiorari or otherwise, either at the instance of the Crown or of any private party, into any superior court. Moreover, no warrant of commitment shall be held void by reason of any defect therein, provided that there is a valid conviction to maintain such warrant, and it is alleged in the warrant that the party has been convicted.

7. All forfeitures may be sold or otherwise disposed of in such manner as the court may direct.

8. In Scotland all penalties imposed under the provisions of this Act by a court of summary jurisdiction may be enforced in default of payment by imprisonment for a term not exceeding three calendar months; and all such penalties recovered and the proceeds of all forfeitures sold under this Act shall be paid to the clerk of the court of summary jurisdiction, and by him accounted for and paid to the persons and for the purposes under stated; that is to say:—

(*a*) To the Queen's and Lord Treasurer's Remembrancer, on behalf of Her Majesty, when the court is the sheriff's court;

(*b*) To the collector of county rates in aid of the general county assessment when the court is the justice of the peace court;

(*c*) To the treasurer of the burgh in aid of the funds of the burgh when the court is a burgh court.

9. In Ireland all penalties recovered under the provisions of this Act shall be applied according to the Fines (Ireland) Act, 1851, or any Act amending the same.

Reservation of Previous Powers with respect to Inflammable Substances.

Section 16.—All powers given by this Act shall be deemed to be in addition to and not in derogation of any other powers conferred on any local or harbour authority by Act of Parliament, law, or custom, and every local authority and harbour authority may exercise such other powers in the same manner as if this Act had not passed; and nothing in this Act contained shall be deemed to exempt any person from any penalty to which he would otherwise be subject in respect of a nuisance.

Repeal of Acts.

Section 17.—The Acts mentioned in Schedule II. to this Act are hereby repealed to the extent in that schedule mentioned:

Provided that such repeal shall not affect any Order in Council made, or any license granted, under any Act hereby

repealed or any liability or penalty incurred in respect of any offence committed before the passing of this Act, or any remedy or proceeding for enforcing such liability or penalty, and every such order, so far as relates to the matters provided for by this Act, and every such license, shall have effect as if it had been made or granted under this Act.

SCHEDULE I.

DIRECTIONS FOR TESTING PETROLEUM TO ASCERTAIN THE TEMPERATURE AT WHICH IT GIVES OFF INFLAMMABLE VAPOUR.

The vessel which is to hold the oil shall be of thin sheet iron; it shall be two inches deep and two inches wide at the opening, tapering slightly towards the bottom; it shall have a flat rim, with a raised edge one quarter of an inch high round the top; it shall be supported by this rim in a tin vessel four inches and a half deep and four and a half inches in diameter; it shall also have a thin wire stretched across the opening, which wire shall be so fixed to the edge of the vessel that it shall be a quarter of an inch above the surface of the flat rim. The thermometer to be used shall have a round bulb about half an inch in diameter, and is to be graduated upon the scale of Fahrenheit, every ten degrees occupying not less than half an inch upon the scale.

The inner vessel shall be filled with the petroleum to be tested, but care must be taken that the liquid does not cover the flat rim. The outer vessel shall be filled with cold, or nearly cold, water; a small flame shall be applied to the bottom of the outer vessel, and the thermometer shall be inserted into the oil so that the bulb shall be immersed about one and a half inch beneath the surface. A screen of pasteboard or wood shall be placed round the apparatus, and shall be of such dimensions as to surround it about two-thirds, and to reach several inches above the level of the vessels.

When heat has been applied to the water until the thermometer has risen to about ninety degrees Fahrenheit, a very small flame shall be quickly passed across the surface of the oil on a level with the wire. If no pale blue flicker or flash is produced, the application of the flame is to be repeated for every rise of two or three degrees in the thermometer. When the flashing point has been noted, the test shall be repeated with a fresh sample of the oil, using cold, or nearly cold, water as before, withdrawing the source of heat from the outer vessel when the temperature approaches that noted in the first experiment, and applying the flame test at every rise of two degrees in the thermometer.

(No. 49.)

SCHEDULE II.

Year and Chapter.	Title.	Extent of Repeal.
25 & 26 Vict. c. 66.	An Act for the Safe Keeping of Petroleum.	The whole Act.
29 & 30 Vict. c. 69.	The Carriage and Deposit of Dangerous Goods Act, 1866.	Sections 8 and 9.
31 & 32 Vict. c. 56.	The Petroleum Act, 1868 . .	The whole Act.

POISONOUS SUBSTANCES.

THE PHARMACY ACT, 1868.

(31 & 32 Vict. c. 121.)

Persons selling or compounding Poisons, or assuming the Title of Chemist and Druggist, to be qualified.

Section 1.—From and after the 31st day of December, 1868, it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons, or to assume or use the title "chemist and druggist," or chemist or druggist, or pharmacist, or dispensing chemist or druggist, in any part of Great Britain, unless such person shall be a pharmaceutical chemist, or a chemist and druggist within the meaning of this Act, and be registered under this Act, and conform to such regulations as to the keeping, dispensing, and selling of such poisons as may from time to time be prescribed by the Pharmaceutical Society with the consent of the Privy Council.

Articles named in Schedule (A) to be deemed Poisons within the Meaning of this Act.

Section 2.—The several articles named or described in the Schedule (A) shall be deemed to be poisons within the meaning of this Act, and the council of the Pharmaceutical Society of Great Britain (hereinafter referred to as as the

Pharmaceutical Society) may from time to time, by resolution, declare that any article in such resolution named ought to be deemed a poison within the meaning of this Act; and thereupon the said society shall submit the same for the approval of the Privy Council, and if such approval shall be given, then such resolution and approval shall be advertised in the *London Gazette*, and on the expiration of one month from such advertisement the article named in such resolution shall be deemed to be a poison within the meaning of this Act.

Regulations to be observed in the Sale of Poisons.

Section 17.—It shall be unlawful to sell any poison, either by wholesale or by retail, unless the box, bottle, vessel, wrapper, or cover in which such poison is contained be distinctly labelled with the name of the article and the word poison, and with the name and address of the seller of the poison; and it shall be unlawful to sell any poison of those which are in the first part of Schedule (A) to this Act, or may hereafter be added thereto under Section 2 of this Act, to any person unknown to the seller, unless introduced by some person known to the seller; and on every sale of any such article the seller shall, before delivery, make or cause to be made an entry in a book to be kept for that purpose, stating, in the form set forth in Schedule (F) to this Act, the date of the sale, the name and address of the purchaser, the name and quantity of the article sold, and the purpose for which it is stated by the purchaser to be required, to which entry the signature of the purchaser and of the person, if any, who introduced him shall be affixed; and any person selling poison otherwise than is herein provided shall, upon a summary conviction before two justices of the peace in England or the sheriff in Scotland, be liable to a penalty not exceeding five pounds for the first offence, and to a penalty not exceeding ten pounds for the second or any subsequent offence, and for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller; but the provisions of this section, which are solely applicable to poisons in the first part of the Schedule (A) to this Act, or which require that the label shall contain the name and address of the seller,

shall not apply to articles to be exported from Great Britain by wholesale dealers, nor to sales by wholesale to retail dealers in the ordinary course of wholesale dealing, nor shall any of the provisions of this section apply to any medicine supplied by a legally qualified apothecary to his patient, nor apply to any article when forming part of the ingredients of any medicine dispensed by a person registered under this Act: Provided such medicine be labelled in the manner aforesaid with the name and address of the seller, and the ingredients thereof be entered, with the name of the person to whom it is sold or delivered, in a book to be kept by the seller for that purpose; and nothing in this Act contained shall repeal or affect any of the provisions of an Act of the session holden in the 14th and 15th years in the reign of Her present Majesty, intituled "An Act to Regulate the Sale of Arsenic."

(No. 50.)

SCHEDULE A.

PART I.

Arsenic and its preparations.
Prussic acid.
Cyanides of potassium and all metallic cyanides.
Strychnine and all poisonous vegetable alkaloids and their salts.
Aconite and its preparations.
Emetic tartar.
Corrosive sublimate.
Cantharides.
Savin and its oil.
Ergot of rye and its preparations.

PART II.

Oxalic acid.
Chloroform.
Belladonna and its preparations.
Essential oil of almonds unless deprived of its prussic acid.
Opium and all preparations of opium or of poppies.

CHAPTER VIII.

ADVICE TO SANITARY AUTHORITY.*

4. HE SHALL BE PREPARED TO ADVISE THE SANITARY AUTHORITY ON ALL MATTERS AFFECTING THE HEALTH OF THE DISTRICT AND ON ALL SANITARY POINTS INVOLVED IN THE ACTION OF THE SANITARY AUTHORITY, AND IN CASES REQUIRING IT HE SHALL CERTIFY, FOR THE GUIDANCE OF THE SANITARY AUTHORITY, OR OF THE JUSTICE, OR TO ANY MATTER IN RESPECT OF WHICH THE CERTIFICATE OF A MEDICAL OFFICER OF HEALTH, OR A MEDICAL PRACTITIONER, IS REQUIRED ON THE BASIS OR IN AID OF SANITARY ACTION.

THE duty of advising the sanitary authority will probably be found the most difficult as well as important of all the duties assigned to the officer. It is not unlikely to bring him into conflict with neighbouring medical practitioners on subjects which are to a very large extent matters of opinion, as, for example, the injurious character of a nuisance or any particular influence, and he must be prepared to find occasions on which his opinions will be controverted or even overruled in the meetings of the sanitary authority. It is also possible that the views on which he founds his advice may not agree with those of the inspector of the district or of the Local

* See also page 181.

Government Board, and generally the duty will be more arduous than agreeable.

At the same time it is an honourable distinction to be the adviser of an authority regulating and controlling the most important influences in a locality, and the position may be one of supreme utility.

Hence it is of the highest moment that the medical officer should realise the difficulty of the task imposed upon him, and adopt such measures as may lessen it. Foremost amongst these are the following:—

1. To advise with great caution, and after due consideration, avoiding, when possible, all instant decisions.
2. To obtain, when practicable, the request in writing, and to supply written answers.
3. To make the replies concise and clear, and by keeping copies to avoid giving different replies at different times on the same subject.
4. To keep a careful record of such questions and answers.
5. To systematically read and study the literature on the numerous subjects involved in the discharge of his duties, and to prepare well-arranged references to the most important papers, discussions, decisions, and inventions, as they come to his knowledge.
6. Although it is most desirable that he should have confidence in and act upon his own judgment, he will find it useful to be prepared to quote authorities in support of his views—relying however less upon the authority of names than of arguments and facts.

7. A thorough comprehension of the principles of sanitary science will be of great advantage in discussing even practical questions, and will carry weight with intellectual and cultivated people, who will not take pains to master the facts. Such should not be restricted to merely technical views, but embrace so much of social science as shall enable him to realise the effect on the community.
8. It is also most important that his views and advice should be of a practical character, and so clear that a merely practical man void of general education may apprehend their value. To this end a knowledge of detail as to sanitary inventions and appliances will be quite requisite, and he should be prepared to show the articles which he recommends, or drawings of them, and their mode of action. He will be able to obtain specimens of nearly all such from various tradesmen, and should arrange to expose them in a room which may be visited by any interested in the subject.
9. The exposition of statistical returns of sickness should be made by diagrams, or otherwise pictorially, and suspended for examination, since the inhabitants of the locality will thus more readily realise the effect of the non-sanitary influences which surround them. The formation of a museum of sanitary apparatus, diagrams, &c., accessible to all persons, would probably do much to obtain a reception and adoption of his recommendations.

Perhaps above all a due regard to the prejudices of many, and the opinions of all, with consideration for those whose

interests are to be affected by his advice, and a proper spirit of concession where it may be allowed without injury to public health, will remove difficulties out of his way. Whilst sacrificing no principle, nor waiving an essential, a due regard to expediency, or even the appearance of expediency, and the adoption of the motto "Festina lente," will tend to obtain coadjutors rather than opponents, and to make him a successful and not an unsuccessful (however able and efficient) officer.

MATTERS FOR WHICH MEDICAL CERTIFICATE MAY BE REQUIRED FOR SANITARY ACTION.

In reference to his certificates, it will be observed that his co-operation can be claimed under this clause only in aid of sanitary action, and not on a multitude of private or *quasi* private matters, for which the certificate of a medical practitioner is daily required.

BY-LAWS.

5. HE SHALL ADVISE THE SANITARY AUTHORITY ON ANY QUESTION RELATING TO HEALTH INVOLVED IN THE FRAMING AND SUBSEQUENT WORKING OF SUCH BY-LAWS AND REGULATIONS AS THEY MAY HAVE POWER TO MAKE.

No one is so interested in the framing a good scheme of by-laws and regulations as the medical officer of health, and he should lend all the knowledge which he can acquire to the preparation and perfecting of them.

The chief advantages are two :—

1. That they establish an authority on health questions in the neighbourhood to which the people will be ready to submit.

2. The greater the number of directions which can have a general application the fewer will be those which must rest upon the opinion of the medical officer of health, and the less is that officer likely to come into collision with individuals. The respect of English people for the law and their independence of opinion will render them more willing to obey when obedience is claimed by written laws than by any individual officer, and the object will therefore be more readily effected by the former than by the latter. Hence the medical officer should induce the sanitary authority to carefully prepare a comprehensive scheme, and to enlarge and amend it as experience of the work in the locality may indicate.

The local authority is empowered to make by-laws on special sanitary subjects, as in reference to overcrowding by the Sanitary Act, 1866, Section 35 (page 207), and to the use of baths and washhouses, by the Public Baths and Washhouses Act, 1846. The following are extracted from the Public Health Act, 1858:—

THE LOCAL GOVERNMENT ACT, 1858.
(21 & 22 Vict. c. 98.)

Section 32.—

(4) The local board may make such by-laws for the prevention of nuisances arising from snow, filth, dust, ashes, and rubbish within their district, or the keeping of animals so as to be injurious to the public health.

Section 34.—The 53rd and 72nd sections of the Public Health Act, 1848, shall be repealed; and in lieu thereof be it enacted as follows:—

Every local board may make by-laws with respect to the following matters; that is to say:—

(1) With respect to the level, width, and construction of new streets, and the provisions for the sewerage thereof;

(2) With respect to the structure of walls of new buildings, for securing stability and the prevention of fires;

(3) With respect to the sufficiency of the space about buildings, to secure a free circulation of air, and with respect to the ventilation of buildings;

(4) With respect to the drainage of buildings, to water-closets, privies, ash-pits, and cesspools in connection with buildings, and to the closing of buildings or parts of buildings unfit for human habitation, and to prohibition of their use for such habitation:

And they may further provide for the observance of the same by enacting therein such provision as they think necessary—

As to the giving of notices;

As to the deposit of plans and sections by persons intending to lay out streets or to construct buildings;

As to inspection by the local board;

And as to the power of the local board to remove, alter, or pull down any work begun or done in contravention of such by-laws:

Provided always that no such by-law shall affect any building erected before the date of the constitution of the district;

But for the purposes of this Act the re-erecting of any building pulled down to or below the ground floor, or of any frame-building of which only the frame-work shall be left down to the ground floor, or the conversion into a dwelling-house of any building not originally constructed for human habitations, or the conversion into more than one dwelling-house of a building originally constructed as one dwelling-house only, shall be considered the erection of a new building.

The following are the powers to make by-laws under the Markets' and Fairs' Clauses Act, 1847 :—*

THE MARKETS' AND FAIRS' CLAUSES ACT, 1847.
(10 & 11 Vict. c. 14.)

Section 42.—The undertakers may from time to time make such by-laws as they think fit for all or any of the following purposes (that is to say) :—

For regulating the use of the market-place and fair, and the buildings, stalls, pens, and standings therein, and for preventing nuisances or obstructions therein, or in the immediate approaches thereto;

For fixing the days and the hour during each day on which the market or fair shall be held;

For inspection of the slaughterhouses, and for keeping the same in a cleanly and proper state, and for removing filth and refuse at least once in every twenty-four hours, and for requiring that they be provided with a sufficient supply of water, and preventing the exercise of cruelty therein ;

For regulating the carriers resorting to the market or fair, and fixing the rates for carrying articles carried therefrom within the limits of the special Act.

For regulating the use of the weighing-machines provided by the undertakers, and for preventing the use of false or defective weights, scales, or measures ;

For preventing the sale or exposure for sale of unwholesome provisions in the market or fair.

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* See also Section 50 (2) of the Local Government Act, 1858.

CHAPTER IX.

ROUTINE ATTENDANCE, AND REPORTS.

11. HE SHALL ATTEND AT THE OFFICE OF THE SANITARY AUTHORITY, OR AT SOME OTHER APPOINTED PLACE, AT SUCH STATED TIMES AS THEY MAY DIRECT.

It is desirable that the office should be a public one, paid for out of the public funds, and not the private house of the medical officer of health, so that every person in the district may feel at liberty to attend on business at the appointed hour. It should be conveniently situate, and if the district be a large one, more than one may be necessary.

It is also desirable that the medical officer of health should attend daily (Sundays excepted) at a fixed and convenient hour, with the utmost punctuality, and leave if there be no business to transact, or so soon as the business shall have been transacted. The importance of this will be the greater if he be not required to give his whole time to the duties of the office, but, if otherwise, a limit of time might be arranged for his attendance.

13. HE SHALL KEEP A BOOK OR BOOKS TO BE PROVIDED BY THE SANITARY AUTHORITY, IN WHICH HE SHALL MAKE AN ENTRY OF HIS VISITS, AND NOTES OF HIS OBSERVATIONS AND INSTRUCTIONS THEREON, AND ALSO THE DATE

AND NATURE OF APPLICATION MADE TO HIM, THE DATE AND RESULT OF THE ACTION TAKEN THEREON, AND OF ANY ACTION TAKEN ON PREVIOUS REPORTS, AND SHALL PRODUCE SUCH BOOK OR BOOKS, WHENEVER REQUIRED, TO THE SANITARY AUTHORITY.

It is probable that book-keeping and report-writing will be an onerous part of the duties of the medical officer of health, but it is necessary, and may in part be done by a clerk. The forms will be provided, but as they may be defective, or capable of improvement, he should carefully consider them by the aid of experience in the discharge of his duties.

The notes to be taken should be terse, but so clear that they may give the information intended to be conveyed by them to any other person. Hence the records or the book which is carried about by the medical officer should be properly dated, and have the names and places, and the nature of the enquiry in full, whilst the observations may be condensed, and all should be legibly written in ink or in some very durable manner. It is also desirable that the views entertained by the medical officer at the time should be entered, as well as any directions which he may have given. Unless these conditions are observed, the notes will lose their value when the facts shall have been forgotten by the medical officer. This is the basis of all correct book-keeping and reports.

The notes should be copied into the proper diary or other books daily whilst the facts are fresh in the memory, and whilst any error may be corrected. Such entries should be quite clear, and convey the idea of the medical officer in as few words as possible to any one reading them. How

tar this transcription into the permanent record may be confided to any other person may be doubtful.

All orders given should be in writing, and all letters, reports, and other written documents, should be copied, and properly classified and preserved. Nothing should be left to memory, and every document should be so kept that it may be found without delay. Hence not only method will be required, but properly kept indices of all documents, classified according to their nature and locality.

Such documents will be public property, and the medical officer is required to produce them to the sanitary authority only; but it is probable that the clause must have a wider interpretation, and include the inspector of the Local Government Board and other official persons, if not persons in their private capacity who may be interested therein.

12. HE SHALL FROM TIME TO TIME REPORT IN WRITING TO THE SANITARY AUTHORITY HIS PROCEEDINGS AND THE MEASURES WHICH MAY REQUIRE TO BE ADOPTED FOR THE IMPROVEMENT OR PROTECTION OF THE PUBLIC HEALTH IN THE DISTRICT. HE SHALL IN LIKE MANNER REPORT WITH RESPECT TO THE SICKNESS AND MORTALITY WITHIN THE DISTRICT SO FAR AS HE HAS BEEN ENABLED TO ASCERTAIN THE SAME.

Whilst no specific period is mentioned, it is desirable that he should report his proceedings to every meeting of the sanitary authority; but such reports might ordinarily consist of his book of proceedings, or of a copy of such book in the same form. When any action is to be taken by the sanitary authority, he should, by a separate memorandum, call attention to his entries and recommendations thereon. As the time of the sanitary authority will be limited and fully

occupied, he need not do more than send a copy of his book, unless he desires action to be taken by them, or have special matter to bring to their knowledge; and in general he will do well not to needlessly occupy their time. At the same time occasions will arise when it is desirable that he should call their attention to matters of unusual magnitude, or involving important principles which must be treated in a separate document, and he should endeavour to restrict such to special periods; as, for example, to a quarterly report, which may be subsequently embodied in the annual report to be further referred to.

The subject-matter of such reports is exceedingly extensive, for the first part of the clause refers not only to the presence and causes of actual disease, but to the general improvement of health in the district. The degree of health will doubtless be due to natural and social causes, apart from constitutional peculiarities inherited from preceding generations; but it may not be an easy matter to name those which have a particular influence in lowering the standard, or to prove it to the satisfaction of others. Hitherto the basis has been the death-rate in different places, and a very imperfect view of the degree of health has been thus obtained, but it may be hoped that the measures now taken will speedily enable us to determine the amount of sickness which is not fatal, as well as that which is fatal, and bring us much nearer to a proper appreciation of the subject.

The medical officer in the report now under consideration will be able to point out conditions which in his opinion exert an injurious influence on health apart from actual sickness, as well as those that threaten, although they may not as yet have operated against, the public health. Such

will for the most part be large and general questions affecting a considerable part or the whole of the inhabitants in a locality, as drainage, water supply, industrial occupation, hospital accommodation, nurses, management of infants and young children, employment of women in agriculture and mill work, poverty, drunkenness, and indeed all those influences which affect the public health, and yet may not cause particular diseases. It supplies a defect which previous clauses had left, but is closely associated with Clause 1.

The second part of the clause takes up the subject of Clause 2, and the proper performance of it will be encompassed with the same difficulties; for whilst he may readily ascertain the mortality, he cannot, without the co-operation of all other medical practitioners, report fully on the amount of sickness. The form of such report should be the same as that of the annual report, to be referred to. It is probable that a form will be provided by the central authority to be used by all medical officers of health, so that it may be uniform and capable of ready tabulation for the whole kingdom. It is therefore desirable that this part of the report should be everywhere presented periodically, whether quarterly or semi-annually.

It may be again stated that the value of such reports of sickness will be not only in proportion to their correctness, but to their completeness, and will be very small if all the sick cases are not included.

ANNUAL REPORT.

14. HE SHALL ALSO PREPARE AN ANNUAL REPORT, TO BE MADE AT THE END OF DECEMBER IN EACH YEAR, COMPRISING TABULAR STATEMENTS OF THE SICKNESS AND MORTALITY WITHIN THE DISTRICT, CLASSIFIED ACCORDING TO DISEASES, AGES, AND LOCALITIES, AND A SUMMARY OF THE ACTION TAKEN DURING THE YEAR FOR PREVENTING THE SPREAD OF DISEASE. THE REPORT SHALL ALSO CONTAIN AN ACCOUNT OF THE PROCEEDINGS IN WHICH HE HAS TAKEN PART OR ADVISED UNDER THE SANITARY ACTS, SO FAR AS SUCH PROCEEDINGS RELATE TO CONDITIONS DANGEROUS OR INJURIOUS TO HEALTH, AND ALSO AN ACCOUNT OF THE SUPERVISION EXERCISED BY HIM, OR ON HIS ADVICE, FOR SANITARY PURPOSES OVER PLACES AND HOUSES THAT THE SANITARY AUTHORITY HAS POWER TO REGULATE, WITH THE NATURE AND RESULTS OF ANY PROCEEDINGS WHICH MAY HAVE BEEN SO REQUIRED AND TAKEN IN RESPECT OF THE SAME DURING THE YEAR. IT SHALL ALSO RECORD THE ACTION TAKEN BY HIM, OR ON HIS ADVICE, DURING THE YEAR, IN REGARD TO OFFENSIVE TRADES, BAKEHOUSES, AND WORKSHOPS.

This important document includes two subjects, viz. the tabulation of diseases, and the proceedings of the medical officer under the sanitary Acts, and specially such as regard offensive trades, bakehouses, and workshops.

The tabulation of diseases and statements of the sickness and mortality will doubtless be made on forms to be provided for him, and it is only necessary to add that such forms should be filled up in a legible hand, in a methodical manner, correctly and definitely, leaving no subject in a state of doubt. This is extremely important, both for the

more ready apprehension of the facts by the sanitary authority and the public, and for convenience of tabulation at the office of the Local Government Board, as well as to enable the latter authority to include every part of the return in their analysis. As this part of the duty of the medical officer will be open to the observation of all, it will doubtless be criticised, and the merits and demerits of the officer clearly observed.

It is essential to its value not only that the numbers afflicted with each disease and the mortality should be stated in absolute numbers, but the proportion of each on some basis, as that of the population and area, should be calculated; but unless the numbers included be large, it will not be needful to extend this to the several ages if the forms should require the several diseases to be tabulated under the several ages. For example, the proportion of the total mortality, and of the total sickness, should be so computed, as also that of the total diseases when classified, and it might be useful to extend it to special diseases, as consumption, ague, typhoid fever, &c. according to locality and season, but not to state the proportion of cases of consumption at each several age.

But little has been hitherto done to show the prevalence of disease in the whole community, or to devise a system of classification which might embrace in detail the diseases of great importance, whilst giving the total numbers of others; yet the field has not been entirely uncultivated. Several private physicians, and particularly Dr. B. W. Richardson and Dr. Arthur Ransome, have collected and published returns of some important diseases occurring in small defined localities, and the following is the list which has hitherto

been generally used by medical officers of health in the metropolis and some other large towns:—

(No. 51.)

1. Smallpox;
2. Measles;
3. Scarlet-fever;
4. Diphtheria;
5. Whooping-cough;
6. Croup;
7. Diarrhœa;
8. Dysentery;
9. Malignant cholera;
10. Erysipelas;
11. Continued fever;
12. Typhus;
13. Enteric or typhoid fever;
14. Febricula;
15. Ague;
16. Rheumatic fever;
17. Puerperal fever;
18. Bronchitis and catarrh;
19. Influenza;
20. Pleurisy and pneumonia;
21. Phthisis;
22. Constitutional syphilis.

Such returns have, however, been obtained almost exclusively from public institutions, and do not, therefore, show truly the prevalence of any of the diseases specified.

The public services of the Navy and Army have, however, published very valuable classified returns of diseases in yearly reports which should be consulted, and which em-

brace the whole populations thus selected and aggregated. Nothing of equal value has hitherto been effected in civil life, but in the year 1869 Mr. Göschen, the then President of the Poor Law Board, instructed me to obtain returns of the in-door and out-door paupers in every part of England and Wales, showing their number, age, and diseases in detail. This was issued as a House of Commons Blue Book in 1872, but it will be found at 468 and 468–1 under the year 1870, and can be obtained.

The returns were far too voluminous for publication, but, when classified into unions and counties, they were issued in two volumes, the first of which contains the report which I made to the President with the summaries of the whole. The enquiry had reference to the population on only one day, viz. the last day of the twelfth week of the half-year ended at Lady-day 1870; and it embraced 153,245 sick persons, of whom 46,922 were in-door, and 106,323 were out-door, whilst the whole population of paupers on that day was 998,964. Hence, notwithstanding the defects in the returns themselves and the mode of issue, the enquiry was one of great magnitude and importance.

As the subject refers to one class of the population only, it is not desirable to enter into it in large detail, but it may aid the medical officer of health, in the preparation of returns, to be acquainted with the leading results which were obtained, and I will therefore extract a small portion of the report.

DISEASES OF PAUPERS.

Medical and Surgical Diseases.

Classification of Diseases.

The classification of diseases into medical and surgical

is, as has been already stated, purely technical, and is not understood in the same sense by the various poor law medical officers.

Medical and Surgical.

As in the general community, the most prevalent diseases are classed as medical, whether in the in-door or out-door paupers. In the in-door they constituted 83·9 per cent., and in the out-door 88 per cent., of the whole; the preponderance in the out-door being probably due to strumous disease, which exists so largely among the poor.

In-door.

For the reason above mentioned in reference to the medical officers, as well as from the nature of the diseases, the proportions varied in the different counties. Thus, of the in-door paupers, all were classed as medical in Flint, whilst in 10 English and seven Welsh counties, including Bedford, Bucks, Cornwall, Derby, Hereford, Hunts, Oxford, Stafford, Westmoreland, and the West Riding of York, the proportion exceeded 90 per cent. On the other hand, it was so low as 66 per cent. in Anglesea, and 70·1 per cent. in Lancaster, and below 80 per cent. in Dorset, Durham, Lancaster, and Nottingham.

Out-door.

Of the out-door paupers, there was no county in which all were arranged in one class exclusively, but the proportion was 90 per cent. or upward in eight English and three Welsh counties, and it was not so low as 70 per cent. in any county. Hence there was less variation in the out-door than in the in-door paupers. When the number of in-door and out-door sick paupers were added together, the proportion of medical cases was 86·7 per cent., and of surgical cases 13·3 per cent.

ACUTE AND CHRONIC DISEASES.

Another similarly large classification of diseases, and one also not always well defined, and therefore open to differ-

ence of opinion among medical officers, is that into acute and chronic.

In-door.

Of the in-door sick 77·2 per cent., and of the out-door sick 57·1 per cent., were classed as chronic cases, and consequently 22·8 per cent., and 42·9 per cent., were acute cases in the two classes of paupers respectively. The proportion of chronic cases in the different counties among the in-door poor varied from 100 per cent. in Radnor to 47·9 per cent. in Pembroke, and the acute inversely from 0 to 52·1 per cent.

Variation in Counties.

The following are the eight counties where the proportion of acute diseases was above 30 per cent.:—Hunts, 43·1; Westmoreland, 40; Lincoln, 39·9; Durham, 36·8; Oxford, 36·6; Northumberland, 34·9; North Riding of Yorkshire, 32·2; Leicester, 31·7. In the following fourteen counties it was below 20 per cent.:—Northampton, 9·4; Cornwall, 12·1; Bucks, 13·5; Worcester, 13; Suffolk, 14·5; Somerset, 15·6; Herts, 15·8; Cambridge, 17·8; Norfolk, 18·1; Essex, 18·5; Monmouth, 19; West Riding of York, 19·3; Devon, 19·3; Derby, 19·7.

The West and the North Ridings of York again appear in contrast, since in the former, which is a manufacturing district, the acute cases numbered only 19·3 per cent.; whilst in the north, which is purely agricultural and seafaring, they were 32·2 per cent. But there is another consideration in reference to the contrast which may have weight, viz. the general hospitals which exist at Leeds and other large towns in the manufacturing districts, to which acute cases are frequently sent, whilst there is little provision for the treatment of the sick in the North Riding except in the workhouses.

As to Climate.

In reference to climate, it will be observed that the northern counties are included in the high proportion of acute diseases, and many of the southern, south-eastern, and south-western have the lowest proportion.

Wales.

In reference to the Welsh counties, the greatest proportion of acute cases occurred in Pembroke, viz. 52·1 per cent., and in Anglesea, Glamorgan, and Pembroke, it was over 30 per cent.; on the other hand, there were no acute cases recorded in Flint, only 8·8 per cent. in Brecknock, and 9·7 per cent. in Montgomery, and in seven of the twelve counties the proportion was less than 20 per cent. Again, it is needful to observe the contrast offered by Pembroke and Flint, and to notice that there are large dockyards in the former county, whilst the latter is agricultural.

Out-door.

Of the out-door paupers, the chronic cases varied in the different counties from 72·9 per cent. in Westmoreland to 42·8 per cent. in Rutland, and conversely the acute from 57·2 to 27·1 per cent.

The average proportion of acute cases in England and Wales being 42·9 per cent., it was 50 per cent. or over in Bedford, Derby, Gloucester, Middlesex, Rutland, Surrey, Worcester, Denbigh, and Radnor. In only one English county was it below 30 per cent., but in Anglesea, Brecknock, Carmarthen, Carnarvon, and Montgomery it was between 20 and 30 per cent.

Comparison of In-door and Out-door Sick.

In comparing these proportions in the in-door and out-door sick, it should be remembered that the out-door are a less selected class than the in-door, and doubtless more nearly represent the conditions of the general community. The proportion of acute cases is on the average nearly twice as great among the out-door paupers, and shows to how great an extent important disease is treated in the homes of the poorest classes, and how few such cases are admitted into the infirmaries of the workhouses of the country.

Anomalies in Yorkshire and Wales.

The striking anomalies in the proportion of acute in-door cases in different counties are not observed among the out-door, and in the two divisions of the county of York, to

which reference has been made, the proportions are very nearly equal, viz. 35·4 per cent. in the North or agricultural Riding, and 34·9 per cent. in the West or manufacturing Riding. The other remarkable contrast in Wales between Pembroke and Radnor does not occur in the out-door paupers, since at Pembroke the proportion is 46 and at Radnor 52·3 per cent. If we could assume that the classification of diseases into acute and chronic is carried out correctly, it would be clear that Radnor, which had not one acute case in the workhouse, had 52·3 per cent. of such cases among the out-door poor, must give out-door relief in an unusual proportion of the sick cases in the union.

Acute and Chronic Diseases in In-door and Out-door Sick combined.

As the sick paupers are thus divided into in-door and out-door in varying proportions, it is necessary to combine them together in order to determine approximately the true proportion of acute and chronic cases of sickness in that large portion of the community. Thus there were 10,718 acute in-door and 45,566 acute out-door cases of disease, giving a total of 56,284 cases, and as the total number of sick paupers was 153,245, the proportion was 36·7 per cent. of acute and 63·3 per cent. of chronic cases. If we compare this with the total number of paupers on the same day throughout England and Wales, it will be found that 5½ per cent. were suffering from acute and 9·7 per cent. from chronic diseases.

In Surgical and Medical Diseases.

The proportion of acute cases is greater in surgical than in medical diseases. On the average of England and Wales, and in reference to the in-door paupers, 36·7 per cent. of the surgical and 20 per cent. of the medical cases were acute, but in the out-door the proportions were 48 per cent. of acute in surgical and 42·1 per cent. in medical cases. When the number of in-door and out-door patients are added together, the results show that in sick paupers generally the proportion of surgical cases which were acute was 43·7, and of medical 35·6 per cent.

Summary.

Thus it appears from the foregoing that, of all the paupers in England and Wales in receipt of relief on the day in question, 15·4 per cent. were sick, 13·3 per cent. were treated for medical and 2 per cent. for surgical diseases, whilst 5·6 per cent. were suffering from acute and 9·7 per cent. from chronic diseases.

Classification of Diseases.

In proceeding to consider the classification of diseases, it is needful to omit 212 of the in-door and 828 of the out-door cases, since the returns do not admit of their classification, and hence the computation must be made upon 46,738 in-door and 105,886 out-door sick paupers.

Great Classes of Diseases.

The most numerous classes of diseases occurring amongst paupers were the six following, viz.:—(1) General Diseases, (2) Diseases of the Respiratory System, (3) Old Age, (4) Diseases of the Digestive System, (5) Diseases of the Nervous System, and (6) Diseases of the Cutaneous System, which, together, constitute 85 per cent. of the whole, and the proportion per cent. of each was as follows:—General, 24·8; respiratory, 19·8; old age, 11·7; digestive, 10·4; nervous, 10·2; and cutaneous, 7·7. These proportions were, however, very different among the in-door and out-door paupers. Thus, general diseases:—in-door, 20·9; out-door, 26·6 per cent. Respiratory diseases:—in-door, 11·5; out-door, 23·5 per cent. Old age:—in-door, 20·9; out-door, 7·6 per cent. Diseases of the digestive system:—In-door, 5·4; out-door, 12·7 per cent. Diseases of the nervous system:—in-door, 18·2; out-door, 6·7 per cent.; and cutaneous diseases:—in-door, 11·3; out-door, 6·2 per cent.

Contrast in In-door and Out-door Sick.

Thus the greatest variation in the frequency with which these diseases attacked the two divisions of paupers was: in old age, which was two and a half times, nervous dis-

eases, which were nearly three times, and diseases of the cutaneous system, which were nearly twice as frequent among the in-door as among the out-door paupers, whilst, on the contrary, diseases of the respiratory system were more than twice and those of the digestive system two and a half times more numerous in the out-door class. The proportion of all these classes of diseases combined did not, however, vary very largely in the two divisions of paupers, since it was 87·9 per cent. in the in-door and 83·2 per cent. in the out-door, giving an excess of only about 4½ per cent. in the former.

The table on next page shows the proportion of diseases classified :—

(No. 52.)

IN-DOOR AND OUT-DOOR MEDICAL RELIEF.

STATEMENT SHOWING THE TOTAL NUMBER OF EACH CLASS OF DISEASE OF THE IN-DOOR AND OUT-DOOR PAUPERS RESPECTIVELY, TOGETHER WITH THE PROPORTION PER CENT. OF EACH CLASS TO THE TOTAL NUMBER OF DISEASES (EXCLUSIVE OF THE NUMBER OF DISEASES NOT CLASSIFIED).

Name of Class of Disease.	In-door.		Out-door.		In-door and Out-door combined.	
	Total Number of each Class of Disease.	Percentage of each Class to Total In-door Sick.	Total Number of each Class of Disease.	Percentage of each Class to Total Out-door Sick.	Total Number of each Class of Disease.	Percentage of each Class to Total In-door and Out-door Sick.
General diseases	9,790	20·94	28,182	26·63	37,972	24·89
Diseases of the nervous system	8,545	18·28	7,110	6·71	15,655	10·24
Diseases of eyes and eyelids	1,012	2·165	999	0·94	2,011	1·32
Diseases of the ear	26	2·06	42	0·04	68	0·04
Diseases of the nose	7	0·01	64	0·06	71	0·04
Diseases of circulatory system	655	1·4	2,851	2·69	3,506	2·29
Diseases of the glands	20	0·043	132	0·12	152	0·09
Diseases of the respiratory system	5,393	11·53	24,895	23·51	30,288	19·84
Diseases of the digestive system	2,508	5·4	13,484	12·74	15,992	10·48
Diseases of the urinary system	535	1·14	1,769	1·67	2,304	1·57
Diseases of the generative system	524	1·12	2,284	2·16	2,808	1·84
Affections connected with and consequent on parturition	903	1·93	2,470	2·33	3,373	2·21
Diseases of the organs of locomotion	516	1·1	1,463	1·38	1,979	1·29
Diseases of the cellular tissue	8	0·02	25	0·02	33	0·02
Diseases of the cutaneous system	5,311	11·36	6,579	6·21	11,890	7·78
Poisoning	10	0·02	49	0·05	59	0·03
Injuries and surgical operations	882	1·89	4,190	3·96	5,072	3·32
Old age	9,783	20·92	8,113	7·66	17,896	11·73
Bedridden	36	0·08	15	0·01	51	0·03
Abscess	273	0·59	1,142	1·08	1,415	0·93
Malingering	1	0·002	28	0·03	29	0·02
Total	46,738	—	105,886	—	152,624	—

It is also of interest to note the proportion of the in-door and out-door sick to the whole population at different ages, as shown in the following table:—

(No. 53.)

PROPORTIONS PER CENT. OF PERSONS LIVING AT THE FOLLOWING AGES.

	Æt. 0 to 9.	Æt. 9 to 16.	Æt. 16 to 40.	Æt. 40 to 60.	Æt. 60 and upwards.
In-door sick . .	8·7	4·9	23·2	20·6	42·6
In-door paupers, 1861	19·7	17·6	19·1	13·5	30·1
Out-door sick . .	16·9	7·1	23·6	22·6	29·8
The whole population	22·0	14·0	38·0	18·0	8·0

Reports of proceedings should be carefully classified under proper heads, as to nature and locality, with the numbers added, and the summary should be concise and clear for tabulation.

They will include proceedings and results as to—

1. The prevention of disease;
2. Conditions dangerous or injurious to health;
3. Supervision and regulation of places and houses, and specially referring to offensive trades, bake-houses, and workshops.

It is very desirable, both to avoid unnecessary labour and want of clearness, that the occasional and periodical reports to the sanitary authority shall be made in such a manner and recorded in such order that they may readily be transferred to the annual report. Thus with quarterly reports of diseases and mortality it will suffice to transfer them to the annual report, with such matter as shall combine

the whole, provided they be made in the precise form of the annual report. As much of the method to be followed in the latter will be at the discretion of the medical officer of health, he should at an early period devise a form which may meet his own views, and to be used by him throughout the year.

But in addition to the bare statement of facts, the scope of the report would include special observations on subjects of unusual importance, and on which the medical officer of health may desire to convey information to others, and particularly to the central authority; and whilst sufficient liberty should be allowed, it is well for the medical officer to bear in mind the great number of such reports which would be received annually, the want of interest of many persons in long dissertations, and the want of time of all to read them. The most useful subjects would be such as point out the defects in the working of the system as proved by experience, and the remedies which in practice have been found useful, whether in action or record, together with additional facts on the nature and extension of contagious and infectious diseases.

It is further desirable that the report in each year should give a very concise preliminary statement of the physical and social characteristics of the district with any marked changes which may have occurred therein.

15. HE SHALL GIVE IMMEDIATE INFORMATION TO THE LOCAL GOVERNMENT BOARD OF ANY OUTBREAK OF DANGEROUS EPIDEMIC DISEASE WITHIN THE DISTRICT, AND SHALL TRANSMIT TO THE BOARD ON FORMS TO BE PROVIDED BY THEM A QUARTERLY RETURN OF THE SICKNESS AND DEATHS WITHIN THE DISTRICT, AND ALSO A COPY OF EACH ANNUAL AND OF ANY SPECIAL REPORT.

The forms for the quarterly returns to the Local Government Board will doubtless be such as may be adopted and used by the medical officer of health for his reports to the sanitary authority. Such reports will form a valuable addition to our sanitary knowledge, and, as they will reflect the condition of every part of the kingdom, will doubtless be carefully analysed and considered by the central authority. It is not too much to expect that a conscientious preparation of them by the medical officers of health and an intelligent examination of them by the Local Government Board will place sanitary science upon a wider and sounder basis.

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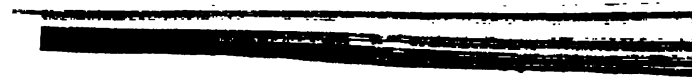

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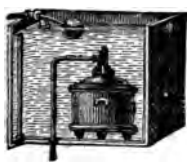

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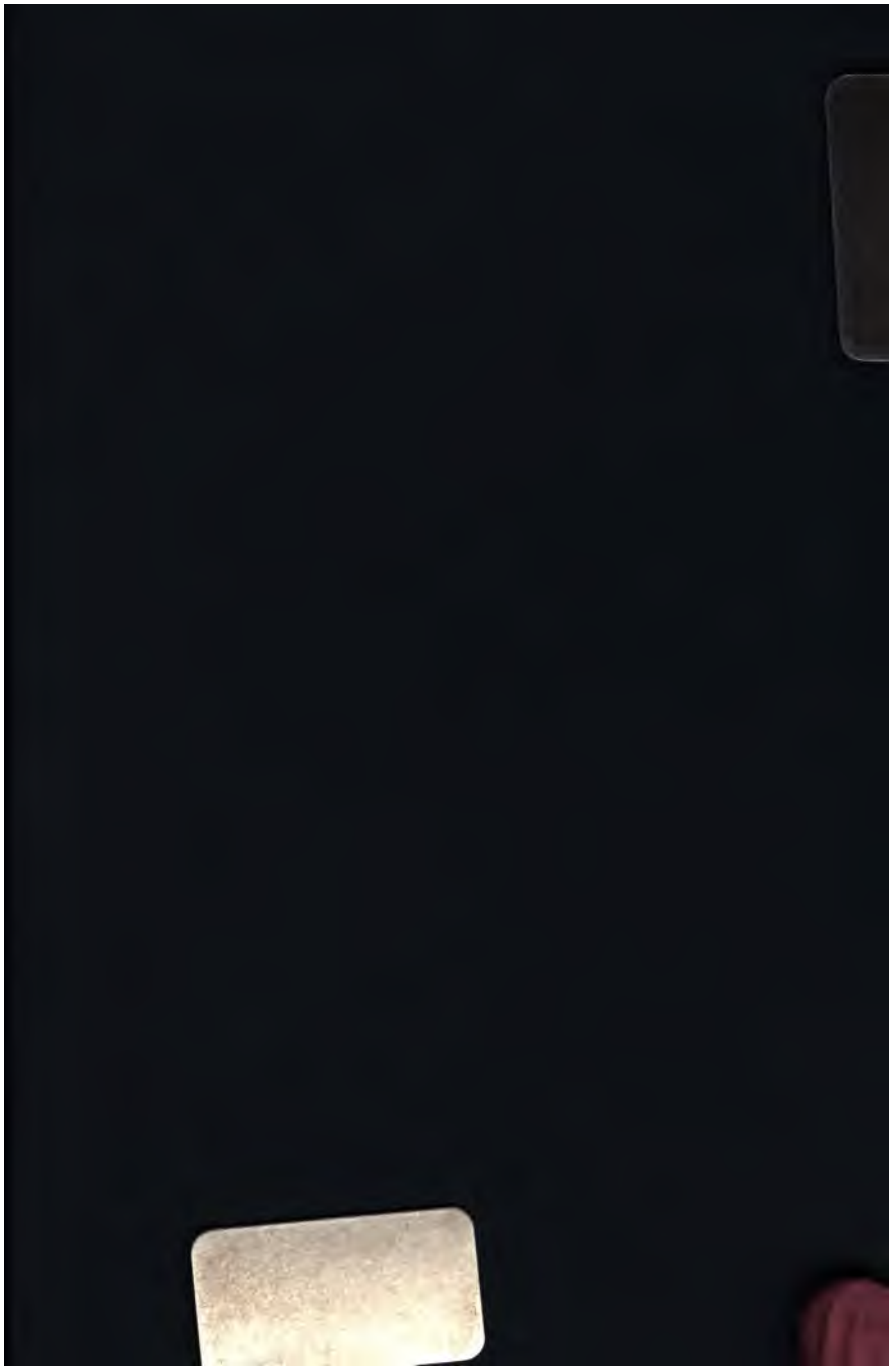
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